WORLD PETROLEUM

NEW YORK AND LONDON

NOVEMBER 1938

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NATURAL GASOLINE PLANT AT LAFITTE FIELD

RETAIL PRICE POSTING STABILIZES NEW JERSEY MARKET

IMPROVING EMPLOYEE MORALE AND RELATIONS

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WORLD PETROLEUM

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VOLUME 9 **NOVEMBER . 1938** **NUMBER 11**

WORLD PETROLEUM: Incorporating Petroleum Equipment Exporter

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CORRESPONDENCE

ADDRESS all correspondence regarding subscription and business matters to the Home Office; 95 River Street, Hoboken, N. J.

Editorial and Advertising offices; 56 West 45th Street, New York, N. Y.

London office; 3 Savoy Place, Victoria Embankment, W.C.2.

Los Angeles office; 412 West 6th Street

SUBSCRIPTIONS

ANNUAL subscription to WORLD PETROLEUM is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union.

For the convenience of subscribers the publisher will accept payment in any of the following currencies at the fixed rate shown below:

Argentina	16 paper dollars
Canada	5.00 dollars
Colombia	5.55 pesos
France	105 francs
Germany	13 reichsmark
Great Britain	1 guinea
Holland	9 guilders
India	1 guinea
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Japan	17 yen
Mexico	18 pesos
Peru	19 sol
Poland	26 zloty
Roumania	675 lei
Russia	6 roubles
Venezuela	19 bolivar

Remittances or drafts should be drawn to the order of the Publisher, WORLD PETROLEUM, payable in New York and London.

Subscriber's name and address should be in Roman capitals on the subscription order.

Official position of subscriber is requested.

Advance notice, if possible, of a change of subscriber's address should be given.

AGENCIES

SINGLE copies of WORLD PETROLEUM are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

CABIMAS, VENEZUELA—The German Store
BERLIN, W. 35, GERMANY—Verlag Chemie G.m.b.H., Corneliusstrasse 3.
MARACAIBO, VENEZUELA—High Life Tailors
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NEW YORK—Telephone Hoboken 3-2480 for list of 20 newsstands carrying copies.
PARIS—Librarie Brentano, 37 Avenue de l'Opera
PORT OF SPAIN, TRINIDAD—Davidson & Todd, Ltd., 8 Frederick St.
LOS ANGELES—412 West 6th St., telephone: Mutual 1391

The price of monthly copies is 2 shillings in countries of the British Commonwealth and the equivalent of 50 cents (U. S.) elsewhere.

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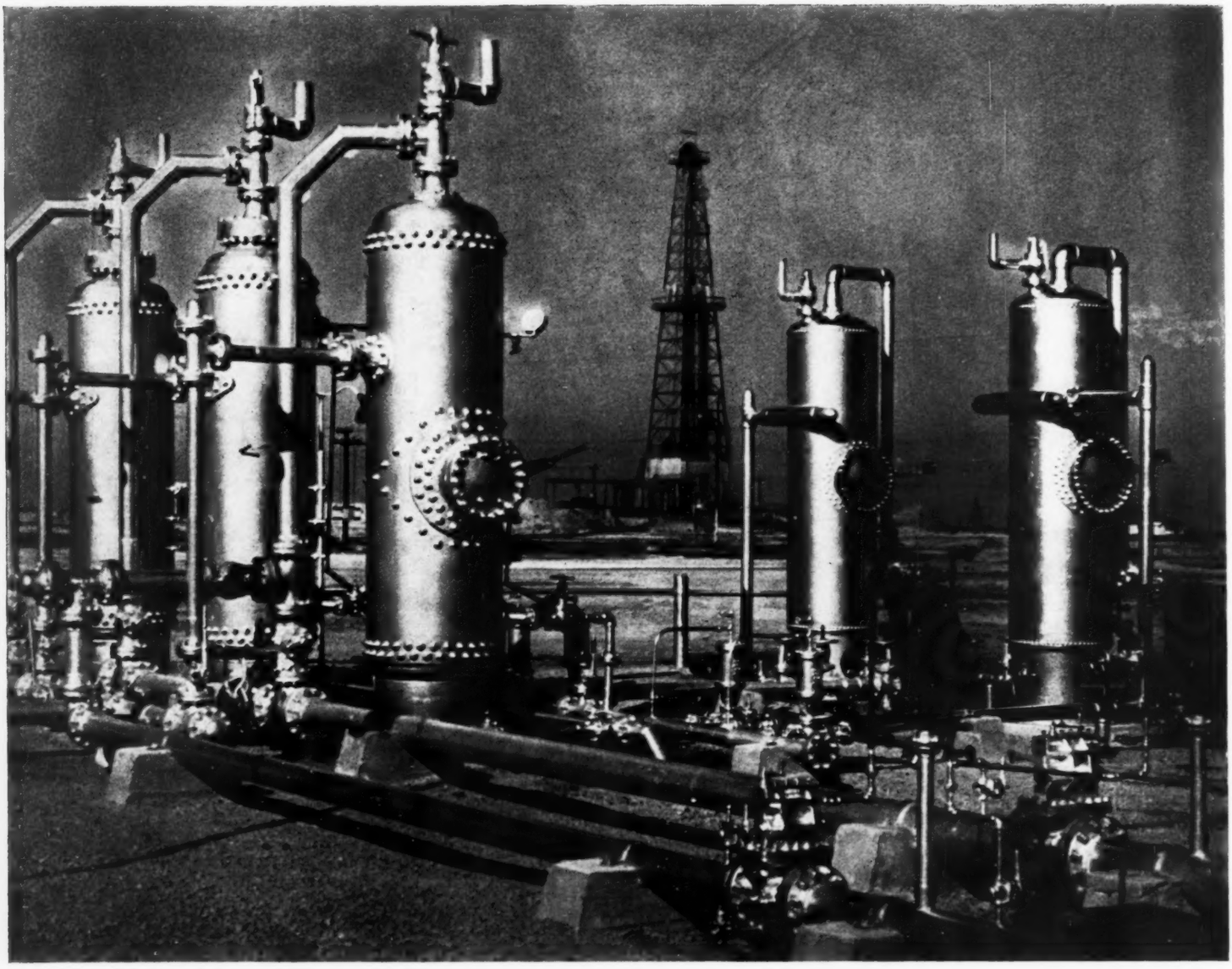


Photo by Clyde D. Graham

A battery of gas traps on the Union Oil lease at Belridge field, California—note drilling well in background.

EDITORIAL

MADISON TRIAL BEGINS TO BEAR FRUIT

FIRST fruits of the Madison trial were realized on October 10th. when crude oil prices, which has been cracking all around the edges for the preceding several weeks, gave way altogether in a general price cut of 15 to 20 cents per barrel.

Within the industry there was no doubt that these lower crude prices reflected the bad condition of the refined oil market. While gasoline consumption was running one to two percent behind last year and fuel oil demand was off at least five percent for the year to the middle of summer, the crude situation had shown substantial improvement. Production of crude under strict proration was four percent below the corresponding date of the preceding year. Stocks of refinable crude were down at least five percent, and at 280,852,000 bbl. on October 1st. represented the lowest point since 1923; only 83 days' supply.

Axtell J. Byles, president of the American Petroleum Institute, commenting on the crude oil situation at the Interstate Compact Commission meeting in Tulsa, late in September, said:

"Statistically, the industry is in fine shape and with that to fall back on there is hope."

Mr. Byles was simply basing his estimate of the situation on past experience. But he failed to take into account that since the Madison trial, past experience is no longer a guide to present changed conditions.

While the crude situation was strong and showing steady improvement, the refined oil statistical position showed weakness. Prior to the Madison trial the stronger financial elements of the industry might have cooperated to remove the pressure of distress offerings of motor fuel from the weakened gasoline market. With one decision against the industry and other suits and investigations pending, the industry was powerless to save the situation.

The result was inevitable: small refiners needing cash threw gasoline on the market regardless of price or effect. With income slashed because of successive cuts in the market price, refiners drew on crude stocks rather than purchase new supplies at the well. Hence the reduction in crude stocks. Mr. Byles stressed this point at the meeting in Tulsa, when he said:

"———the producer can hardly blame the refiner for running a lot of stored crude rather than to buy all his requirements at the well. Refiners are low on cash and if they run on stored oil it cuts down their commitments considerably."

The administration brought about this situation among the refiners. They could no longer turn to the financially strong companies for cash. By October 3rd. Barnsdall announced that it would close its refinery. Tidewater considered closing its Drumright refinery. Eason Oil Company actually closed its Enid, Oklahoma, plant. The anti-monopoly suit further placed in jeopardy stripper producers throughout the country. In North Texas alone 15,000 stripper wells each producing about three barrels per day, 75 percent owned by small independents, were rendered practically profitless. If plugged back these wells will never produce again, destroying production of 45,000 bbl. per day that might have continued for many years.

This is neither conservation, economic good sense, nor does it help to destroy monopoly.

In its effort to punish the oil industry for not accepting federal control the administration has made itself responsible for a costly waste. The cost to the nation in loss of stripper production, decreased royalties, loss of stock dividends, loss of employment and loss of some part of the purchasing power of the oil industry, reflected in steel, machinery, rail transport, etc., is incalculatable. And these losses will fall, not on the management of a few large corporations, but on the millions of refinery and oilfield workers, small stock and royalty holders, small business men—the public.

STATUS OF MEXICAN EXPROPRIATION

MEXICO CITY, OCTOBER

WHILE diplomatic exchanges between Mexico City and Washington over the seizure of properties belonging to American citizens without compensation drag on without visible progress it is interesting to observe how Mexico itself is faring with its most spectacular act of expropriation—the confiscation of oil company holdings valued at $450,000,000, more or less.

Plenty of time is being allowed the Cardenas administration to demonstrate whether, as claimed, it can operate oil wells and refineries more successfully than the private owners and with better results from the viewpoint of the national economy. Over seven months have elapsed since President Cardenas, without previous warning, pronounced the oil properties forfeit, forced the managers to leave their posts and installed labor union representatives and political appointees in their places. To the average person this would seem to be a sufficient length of time for the new system to get into smooth running order if it was destined to be a success or for chaos to prevail in the industry if that was to be the ultimate outcome.

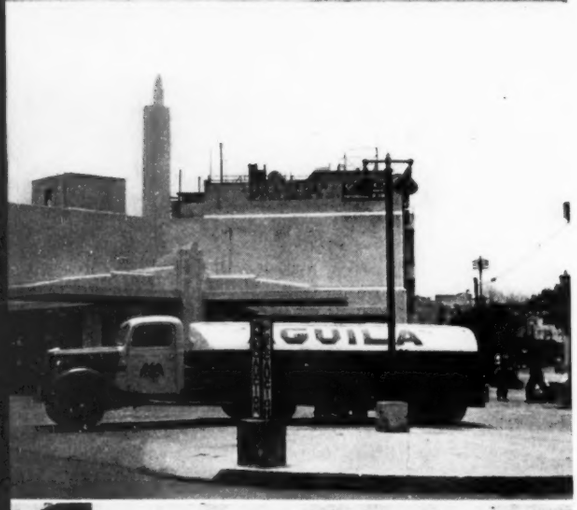
Oddly enough, however, the situation appears almost as uncertain as it did in the hectic days immediately following confiscation. Certain it is that neither the prophecies of a quick millenium nor of overwhelming disaster have been realized. Despite losses of oil revenues aggravating its former bankrupt condition the government has managed thus far to carry on, largely by means of union discipline. On the other hand, economic conditions are definitely worse than they were in mid-March and the lot of industrial workers is decidedly harder because of the depreciation in the value of the peso and constantly rising prices adding to the cost of living.

Oil industry workers not only are not receiving the high wages awarded by the labor board in the investigation preceding confiscation but they have lost many of the special privileges and benefits that they enjoyed under the regime of private ownership. Their discontent has found open expression here and there but all demonstrations have been quickly and sternly quelled. The politicos and labor union officials now in control have proved to be harder taskmasters than those whom they displaced. Increasingly they see with their own eyes labor leaders going in heavily for luxuries while denying them necessities. In the oil industry this became evident first at Poza Rica, then Tampico. Now, on October 21 the oil workers syndicate down on the Isthmus of Tehuantepec has sent a protest to Cortes Herrera regarding his call for collaboration and sacrifice owing to the difficult economic situation in the petroleum industry. They ask why the labor leaders do not make sacrifices, too—charging that the local officials have been buying electric refrigerators, stoves, and automobiles; and then, when poor watchmen ask for equipment against the rain, are given second-hand leaky rubber boots.

The most significant acknowledgement of impending trouble, however, came with the opening of the first National Exporters Congress on October 24. This had been anticipated with much acclaim; but a discordant rather than joyous note opened the meeting when the Chief of the Department of Foreign Commerce of National Economy pessimistically asked the Congress not to expect too much immediately. He stated that Mexico is not ready yet to export, and will not be until there is an intensification of Mexican production.

Oil workers are a small fraction of the total population, however, and while they were coddled and made much of when it served the purpose of the higher powers to use them in fighting the oil companies their disabilities arouse no great concern now.

Here in Mexico City the cost of living, gradually rising since April, has now reached the stage where complaints are audible. Taxicab owners in Mexico City—and most of them own only a car or two—have been grumbling for months that American tires cost nearly double what



© Jack Starr-Hunt

Painters and paint dealers in Mexico have acquired a brighter outlook on life as the government carries out a wholesale redecoration of expropriated filling stations and trucks with a light grey instead of the former oil company colours. Upper photographs show stations being repainted, while lower pictures show the newly acquired appearance.

they did six months ago, and Mexican tires fifty percent more, with heavy increases in parts. The chauffeurs who rent cars and have to buy their own oil and gas finally protested out loud late this month against a 25 percent increase without notice in the price of lubricating oil.

There have been shortages of motor fuel at times in various places and many complaints about the quality; but in general, the internal trade in petroleum products has gone on about as usual except that the deepening depression and the absence of tourists has cut down demand. Domestic business never brought any profit to the oil companies, however, and can hardly be more remunerative to the government.

Export trade in petroleum which formerly created foreign credits for Mexico amounting to hundreds of millions of pesos and yielded other millions in revenues to the government presents a different picture. In former years exports averaged around 2,000,000 bbl. per month. From March 19 to October 6 this year the most strenuous efforts of the government to find outlets for oil have resulted in shipments of less than 6,000,000 bbl., or at the rate of slightly under 900,000 bbl. monthly, something less than half of normal. This is not the whole story either. Practically all the oil shipped has been sold much below former prices and below prevailing Gulf Coast quotations. Little, if any, of it has been exchanged for cash, the greater bulk being disposed of on a barter basis for machinery and other products. From the viewpoint of revenue, therefore, the Mexican government has been out of pocket the full amount of the income it formerly received from oil taxation amounting to 30,000,000 pesos annually.

A compilation of export shipments from Mexican ports for the period from March 19 to October 6, which is believed to be highly accurate, shows the following quantities:

Product	Bbl.
Poza Rica crude	1,678,499
Panuco crude	955,048
Kerosene crude	14,531
Crude gasoline	951,194
Gas oil	1,705,413
Fuel oil	376,603
Asphalt	153,350
TOTAL	5,834,638

Of these shipments approximately 40 percent have gone to Germany. According to published statements this oil has been exchanged for drill pipe, casing, farm implements and machinery manufactured in Germany.

Apparently then expropriation of the oil properties which cost American and British interests some $450,000,000 is not benefiting Mexico as a whole. The government is losing much-needed revenue, thereby delaying the social reforms that were to be accomplished with the additional funds to be derived from government operation of the oil industry. The oil workers are considerably worse off in regard to wages and social benefits than they were prior to March 18th of this year. Other workers in Mexico City and elsewhere suffer from increasing cost of living, falling off in employment and restricted market for domestically produced goods. At the same time the government has become involved to such an extent with powerful labor leaders and left wing politicians that it is no longer at liberty to act entirely for the best interests of the nation.

Night view of repainted station with green neon PEMEX sign.

© Jack Starr-H

If Washington through sympathy for the social and political objectives of the Cardenas administration was prompted to hold its hand heretofore, it is becoming clearer day by day that these objectives are not being achieved. If the good neighbor policy is intended to apply to Mexico as a whole nation, and not to a small group of labor leaders and politicians, then it is high time that the policy was put into effect to save the country from a group that has demonstrated its inability to better the lot of the majority of the people of Mexico.

Considering that the Cardenas administration is powerless to reverse the course on which it has embarked; considering that this course is proving to be not in the interest of the nation; then, as a good neighbor, Washington should apply such economic pressure as would be necessary to halt this trend and permit the people of Mexico to return to a social and political system that will enable them to proceed with social, agricultural and industrial reforms and gradually achieve the objectives originally set up by Cardenas before his policy came under the control of Toledano and his communistic associates.

The United States government can help Mexico to secure lower costs of living, larger income from exports, greater social benefits for workers, and a higher standard of living. But in order to do this Washington must first withdraw those assistances and subsidies that make it possible for the present controlling party in Mexico City to continue to rush the country down the path toward bankruptcy and repudiation.

This would involve a discontinuance of the silver purchasing policy by which the United States is acquiring Mexican silver at a minimum rate of $5,000,000 per month. It would also be necessary to close this market to the importation of Mexican products which would result in decreasing Mexican national income by a further $3,800,000 per month. And the importation of expropriated oil from Mexico would have to be prohibited because of unfair competition. Stolen properties on which the Mexican government does not have to charge anything off to capital investment obviously give its products a most highly unfair and illegal advantage.

Under these circumstances, it would become essential for the Mexican government to retreat from its present uncompromising position. When this situation was corrected, and the government freed of the control of the Toledano group Mexico could once more return to a path of sane progress toward the improvement of the condition of the whole nation.

The present position of Washington in extending just sufficient assistance to Mexico to maintain in power a group of politicians who are gradually making the situation of the people intolerable, is the exact reverse of good neighborly.

TEXAS COMPANY'S Natural Gasoline Plant at Lafitte

By L. K. Laney
The Texas Company

In the area due south of New Orleans, between Barataria Bay and the bend in the river which gives the Crescent City its name, lie the swamp lands and bayous made notorious, around the year 1800, by the pirate Lafitte and his band of cut-throats. Covered with marsh grass, toward the south are the swamps; uninhabited, uninhabitable, while farther north, where the ground is higher and more stable, the bayou banks are thick with vegetation and dotted with fishermen's homes. Swamp oaks and cypress, draped with hanging moss, grow amid dwarf palms and native bushes, forming, in places, an almost impenetrable jungle.

It is, however, with the marshy swamp, "too thick to swim in, too thin to walk on," that we are interested, for there, some 25 miles south of New Orleans, on Dupree Cut, a government canal dug to give the fishermen of the habitable regions better access to Barataria Bay and the Gulf, a salt dome has been discovered by the geophysicists, the upthrust of which has formed reservoirs containing large quantities of high gravity crude oil. Logically enough, this dome has been named for the pirate of early days, and the producing area is known as the Lafitte oil field.

All transportation in this area is necessarily by water. The nearest rail head is at New Orleans from which point materials and equipment are transported by boat and by barge, for at least the last part of the trip, since a road connects with Lafitte Landing, some ten miles up the canal from the field. The discovery well was drilled from a mat foundation, but it soon became apparent that floating drilling equipment would be best suited to this terrain.

Double hull marine drilling barges, developed by The Texas Company, have been used to drill subsequent wells and their use has resulted in a very acceptable saving, both in drilling time and in drilling costs. Canals, for the movement of this equipment, checkerboard the field, leading to each of the 25 wells already drilled.

It is on the bank of one of these canals that the gasoline plant to be described was built.

There is very little tidal effect in the Lafitte area but the direction of the prevailing winds may blow the water in from or out into the Gulf of Mexico in quantities such that changes in water level of as much as three feet or more occur, high or low water persisting for several days at a time. This makes the navigation of the canals by heavily loaded barges rather uncertain. It also necessitates the elevation of permanent structures well above the mean water level.

Lafitte is a flowing field, and every effort is made in completing the wells to insure as low a gas-oil ratio as possible. Some gas in excess of the requirements of development work is produced. A market for this excess gas was found some 25 miles away and a gas line, lying almost entirely in the waters of Barataria Bay, was constructed for its delivery.

Uninterrupted delivery of fuel gas to the purchaser was the requirement laid down when the design of this set up was authorized. The gasoline plant, separators and gas line were, therefore, designed as a unit. Every precaution was taken to make this inter-operation simple and reliable, automatic and safety devices were freely installed and the result has been a minimum interference with oil production combined with a maximum of service by the gas line.

Not once, since the line was placed in operation, has gas in ample quantities failed of delivery to the customer.

The pressure required to transport the gas to market was readily available from well pressure, but even at these higher pressures the gas carried enough condensable constituents to interfere seriously with the operation of a gas line. It was therefore decided to construct a pressure type absorption gasoline plant to dry this gas before it entered the submerged line. An examination of the gas released subsequent to the high stage separation indicated a gasoline content such that its recovery presented an attractive investment. Accordingly two-stage separation of the gas from the oil and two-stage treatment for recovery of the gasoline, was decided upon. The wells flow first into high pressure separators, where pipe line gas is separated at 500 lb. pressure and then through low pressure separators where additional gas is separated at 20 lb. and finally to the stock tanks from which evolved vapors are recovered and all gas and vapors are passed through the gasoline plant absorbers.

Separator batteries and tank batteries for each of the seven leases comprising the Lafitte field are located adjacent to the plant site and are connected with it by means of elevated walkways on which the gas lines, etc., are supported. A height of three and a half feet above mean water level has been adopted for separator platforms, meter platforms and their connecting walkways, which are somewhat remote from the canals, while a height of five feet has been adopted for all units of the gasoline plant proper.

Due to the marshy nature of the location, all permanent structures must be supported on piling. There is no hard pan or gravel underlying the swamp so that bearing value of piles comes entirely from skin friction. Before beginning construction work, driving and loading tests were made to determine these bearing values and the piling foundations for the various parts of the plant were designed, based on such values.

GATHERING

From each separator battery serving each lease, two six inch gas lines lead to meter settings adjacent to the plant operating platform and the high pressure gas and the low pressure gas produced from each lease is measured separately. High pressure gas is consolidated into a line leading through a high pressure separator of special design, through the high pressure absorber, having a capacity of 15,000,000 cu. ft. of gas per day at 500 lb. pressure, through a residue gas scrubber and a mist extractor, and thence into the gas line. Automatic regulators maintain a constant pressure on the gas line meter setting, and on the line, irrespective of the volume of the gas demand, while the excess high pressure gas is diverted to the lease fuel lines.

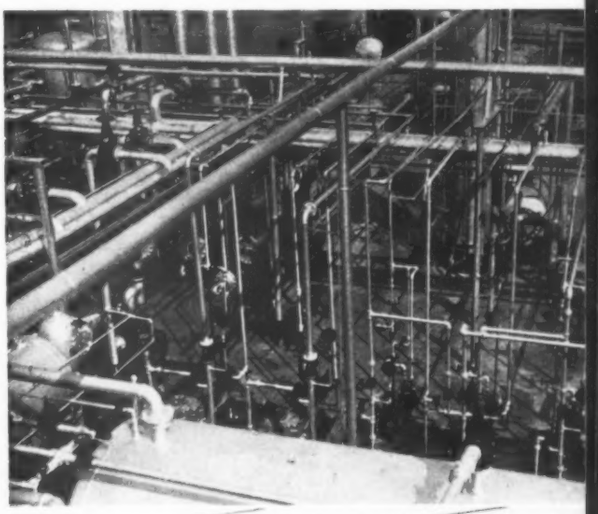
After being metered, the low pressure gas is consolidated into a line leading through a large scrubber tank after which the gas stream is split equally between two low pressure absorbers having a combined capacity of 5,000,000 cu. ft. of gas per day at 20 lb. pressure. Vapors from the lease tanks, vapors evolved in loading the tank barge and those from other plant operating units, are gathered by a steam driven compressor and passed through the low pressure absorbers.

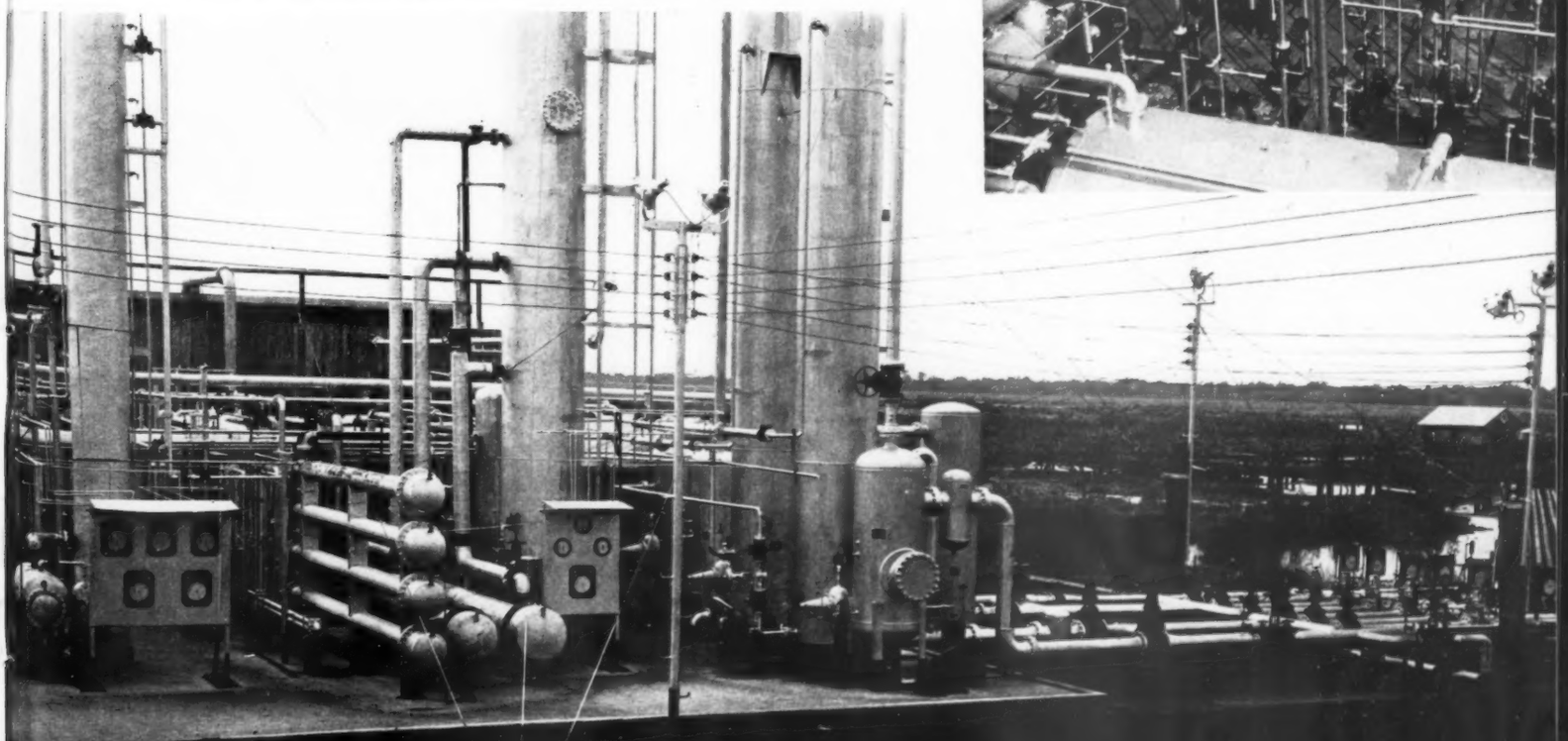
The stabilizing column works through a wide range, producing at one time high vapor tension natural gasoline with full inclusion of butanes and at another a butane free motor fuel. All motor fuel used by the company's marine equipment in this South Louisiana area, amounting to some 30,000 to 35,000 gallons per month, is made by Lafitte gasoline plant. In addition it produces some 6,500 to 7,000 gal. per day of 26-70 natural gasoline.

PLANT

The plant is divided into four main operating sections, each having a piling foundation built in accordance with the requirements of the type of equipment mounted on it. The first is the boiler foundation; piling, capped and floored with wood, to support six 125 h.p. boilers with their accessories such as condensate receivers, boiler feed pumps, automatic regulating devices, etc. This equipment is all housed in a steel building. Adjacent to it is a small office building, on a separate foundation, which also contains a small laboratory and a store room for meter parts and small fittings.

A raised walkway 150 ft. long connects with the plant operating platform on which is mounted the absorbing, distillation and fractionating equipment with





Each of the four main operating sections has a special foundation.

their pumps, heaters, heat exchangers, scrubbers and accessories. This platform also is supported on piling but is floored with concrete, curbed all around, and equipped with drains leading to a sump tank, so that no oil or gasoline can escape to contaminate the surrounding waters. Only the steam compressor, used for gathering lease tank and plant vapors, is housed. All other equipment operates in the open since the climate at Lafitte, except for a rather copious rainfall, is semitropical and frost is a rarity.

Adjoining the operating platform is the cooling coil tower, housing all cooling and condensing coils used in connection with the plant operation except those for condensing exhaust steam. This again is mounted on an entirely separate foundation as the coils are carried about five feet above the operating platform to simplify the piping work and to give drainage from each coil into its tank or receiver.

Separated some 15 ft. from the cooling tower, to allow space for the removal of coils, is the foundation carrying the gasoline storage tanks. These are horizontal, cylindrical pressure tanks, having a combined capacity of 80,000 gal. In front of these tanks, and supported on the same foundation, is a walkway carrying the connecting headers, drain lines, vapor lines and the loading lines and hose for loading the gasoline for transportation to market. This walkway is extended over the bank of the canal to deep water so boats can land beside it. It also connects with the plant operating platform, and thus all the various units of the plant are accessible, one from the other.

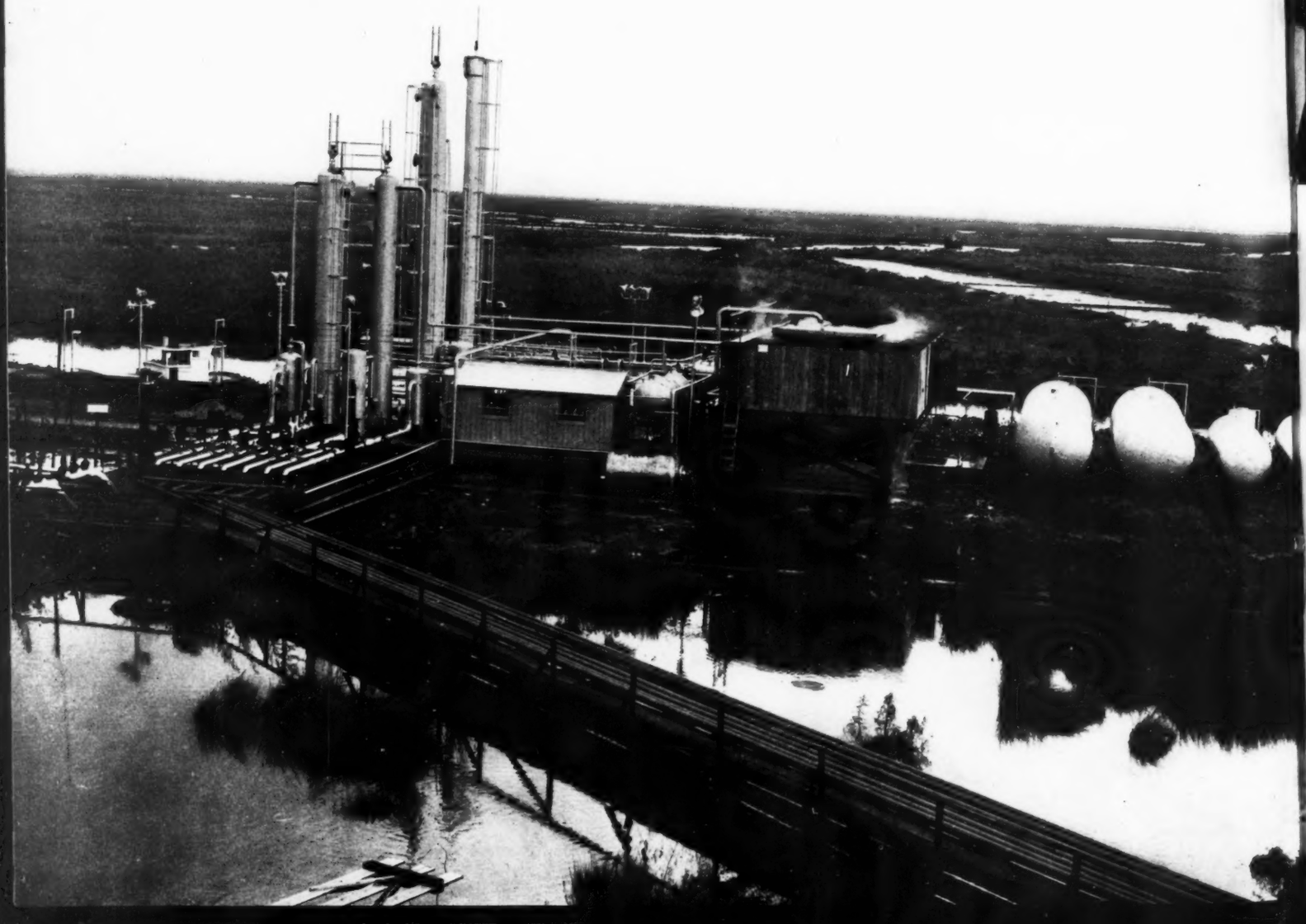
BARGE

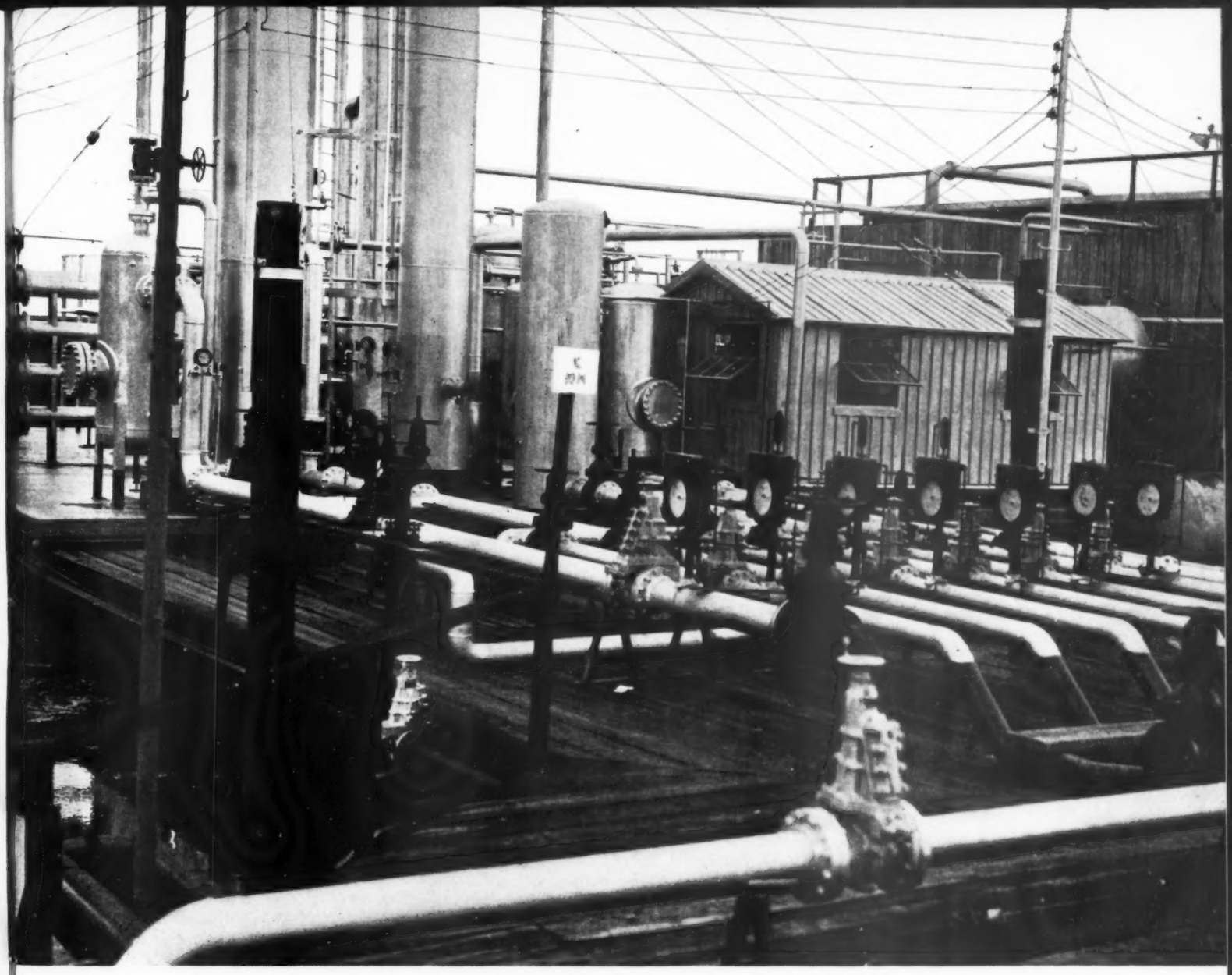
Since the plant side can be reached only by water it is necessary to ship all products in a tank barge. This barge, fireproof and of all steel construction, was built to the specifications of the U. S. Department of Commerce and carries their operating license. It consists of four pressure tanks, having a capacity of 32,000 gal. of cargo, mounted in a well in the barge hull. Special vacuum and pressure relief valves are provided for each tank and a pump capable of unloading the cargo in some four hours is a part of the equipment. All gasoline loading and unloading lines, as well as vapor relief lines, are welded. Motor fuel is transported with this equipment to various domes within a radius of some 25 to 30 miles of the plant, while the commercial natural gasoline is barged to an unloading terminal on the Mississippi River. The barge is also used for bringing absorbing oil from The Texas Company terminal at Harvey, Louisiana, to the plant.

CONDENSING

The only other feature of the plant design deserving of special mention is the means used for conserving boiler water. The water of the bayous and canals in the Lafitte area is brackish and unfit for boiler use. All fresh water used for the living quarters of employees, as boiler makeup water for drilling rigs and for the gasoline plant, is brought a distance of some 20 miles by barge from the Mississippi River. The expense of delivering this

The cooling coil tower at the Lafitte plant is mounted on an entirely separate foundation.





All tanks and process vessels at the plant are painted aluminum, all buildings gray, while piping is aluminum or black as the service dictates.

water makes its conservation of prime importance.

In order to keep the consumption of boiler makeup water for the plant at a minimum and also in order to conserve heat, a dual condensing system is used. All process steam is condensed at 150 lb. (boilers operating at 180 lb.) and returned continuously to the boilers by a pump under control of a float in the high pressure condensate receiver. The exhaust steam from pumps, turbines and compressor is conveyed at about five pounds pressure through a tubular condenser mounted directly over the low pressure condensate receiver and is returned to the boilers by a pump under control of feed water regulators on each boiler. Makeup water is automatically fed to this receiver as required. Boiler fuel governors control the rate of firing which, with the hot feed water system, provides a boiler plant requiring a minimum of attention by the operators and one on which the makeup water demand is less than one percent of the water evaporated.

All tanks and process vessels of the plant are painted aluminum, all buildings are gray, while pumps are green and black. All the piping on the plant platform and between there and the boiler house is supported overhead on flexible hangers and is painted aluminum or black as the service dictates.

Everything possible has been done to insure the safety of the plant and of the operating personnel. Guard rails line the walkways and surround the various operating platforms, flood lights illuminate all working spaces at night, automatic and safety devices have been provided wherever required, while fire protection has received especial consideration. Steam connections with steam hose attached, and water outlets, have been provided at stragetic locations around the plant.

Foamite engine fire fighting equipment is installed at easily accessible locations, while carbon dioxide containers, of hand size, are installed throughout the plant.

HIGH-POWERED TANKER

JAPAN'S new tanker ITUKUSIMA MARU probably represents the highest power on a single screw in any motor vessel. At 19.79 kt. she develops 11,693 b.h.p. on a consumption of 47 tons of Diesel fuel daily and at 19.42 kt., 10,500 b.h.p. at 43½ tons daily.

JUNGLE Drilling Preparations Take Two Years

DURING July, 1938, a persistent oil well drilling crew spudded a wildcat well in the Andean jungles of Peru after more than two years of initial preparations. Speaking of his crew, J. E. Brantly, who is drilling contractor for Cia. de Petroleo Ganzo Azul, recently stated "I have never seen a finer, cleaner, more loyal and harder working group of men together. Each man is doing his job as well as it can be done. The natives are an excellent bunch of men, good workers and unspoiled; they are rather small, but will be able to do the job quite satisfactorily. I have always been worried about firemen more than anyone else, but we were fortunate in getting several old river steamboat firemen and I think that if they could hold steam on those old pots, they will get along without difficulty on our boilers."

Mr. Brantly supplied the information on which the rest of this article is based.

The well is located inland and six miles from the banks of the Rio Pachitea. The site was reached, and men and equipment moved to it, by ship, railroad, motor vehicle, airplane, river boat and tractor.

It is easy to realize how the Agua Caliente structure was picked up when a geologist flew over the area surveying for a possible railroad, when viewed from the derrick. The topographic expression is of an eroded dome-like anticline with rather high steep hills of irregular outline in the central part surrounded by a high ridge sloping away from the center of the feature. The slope of this ridge expresses the inclination of the Sugar Sandstone of which it is composed. It is practically continuous except on the southern river side where it is broken through by the Pachitea. The inner hills of the eroded anticline are steep with cliffs and hog-back ridges. These hills are of fine flour sands, blue plastic shales, mottled red and white clay-shales and massive sandstones. The dips vary from 10 to 20 deg. away from the long axis with the steeper ones to the southeast. The structure strikes in a direction about NE-SW and is some six miles long and three miles wide within the well-defined dips.

It was this encircling dip slope that enabled the feature to be located from the air, together with the hills rising suddenly from the flat flood plain of the Ucayali and Pachitea. It is estimated that the highest of the hills of the topographic feature reach an elevation of some 600 ft. above the level of the river and about 1,000 to 1,200 ft. above sea level.

Westward and southwestward the foothills of the Andes are readily visible—green hills, ridges and mountains from which issue sinuous ribbons of greenish and red water. The Rio Ucayali flows north along the eastern foot of the Andes, but well out in the basin. It is fed by and attains its magnitude from the lesser streams which flow east and northeast from the mountain valleys. These abundant waters against the recently and steeply lifted and folded strata of the Andes have resulted in many small streams which flow in torrents down narrow, steep-walled canyons. The fall on one such stream is about 6,000 ft. in 25 mi.—what a stream for water power development.

To the east and for 90 deg. in either direction, a broad flat expanse extends to the distant blue horizon. Streaks of dark green and spreads of light green, strips of green water contrasted by stretches of red water, cloud shadows, jungle. In the distant east is Brazil, 50 mi. away, the tops of a range of igneous plug-like hills or low mountains. They are somewhat to the northeast and are said to have seepages in their vicinity. The topographic feature may be an eroded structure, but it looks more like igneous extrusions from a distance.

The clearing has the derrick on the east side and on the highest point, with the boilers set about 200 ft. to the north along the narrow ridge and the fuel yard next. Immediately west of the derrick is the wardhouse, an open-work, thatched roof arrangement. Further is the American bunk house, consisting of eight rooms, four on each side, all surrounded by a verandah. The latter is screened as are the rooms, giving double screening. The bathroom is attached to the northwest corner. The dining room, kitchen, storerooms and club room are in another well-screened building 25 ft. from the bunk house and connected to it with an open, roofed passage-way. Both buildings are built of native mill-cut *cerar* with palm thatched roofs. The laundry is an open palm-thatched shed where there are home made washing tubs and a washing machine manufactured by one of the crew and a native carpenter. It is run with an extra refrigerator motor. The Doctor's quarters and dispensary are southwest of the bunk house on a ridge that extends westward from the location ridge.

There is plenty of hunting and fishing in the Agua Caliente district, with the natives recommending monkey meat as highly palatable and the Americans conservatively sticking to canned foods. Supplies of the latter are plentiful and good, but the native cooks are not overly conversant with its preparation. One day lunch consisted of fried sweet potatoes with sliced raw onion spread over—and at the same time, spinach floating around in tinned milk. Such things behooved Mr. Brantly, during his visit last summer, to get his hand in again. So he made a few salads, mayonnaise (the first time in 20 years) and a chicken pie. Later he baked a ham.

The port on the river where the cargoes of equipment are unloaded consists of quarters for the Americans, a native village having probably ten houses or *jacales*, a temporary warehouse and unloading facilities.

The water near the Ganzo Azul landing being sufficiently deep, the captain of the river boat decided to deliver the long-awaited cargo of drilling equipment and other supplies direct to the dock, without transfer to the launch. Soundings showed a minimum of two fathoms of water. What a river, considering that its source is only 100 mi. from this point.

Within a week of spudding the well it lost circulation at 330 ft. The mud was poor, so the crew shut down and located another supply composed largely of roots and partly decomposed vegetable matter which it was assumed would shut off the crevice that was taking the fluid. It worked, for after the hole had taken not more than 100 bbl. of mud, full returns were obtained. Drilling the hole for the surface pipe was a difficult job. The formation was hard sandstones, grits, and fine primary and secondary gravels from 105 ft. About the same thing was anticipated from then on, but with a few good breaks, maybe as much as six inches thick.

Starting up again after sealing off the crevice, a 10⅝ in. hole was reamed with the Zublin bit. The Zublin was pulled and a fishtail run in the hole, but although the former came out in good shape the latter did not seem to want to follow it, and reaming was necessary practically all the way. The supply of bits was found inadequate for the big hole—one Zublin and three fishtails—and the latter were almost seless. The Zublin was worn out quickly and going was tough with only the fishtails to make hole. The reaming was hard and it was decided that on the next job there would be plenty of bits. After the pipe was set it didn't matter; the crew had good bits and the formation cuts with rock bits. What had been needed was some 16 in. Crums. Mr. Brantly said that it was the hardest surface hole his outfit had ever made, with the possible exception of Jacalitos Canon—and he's had plenty of experience.

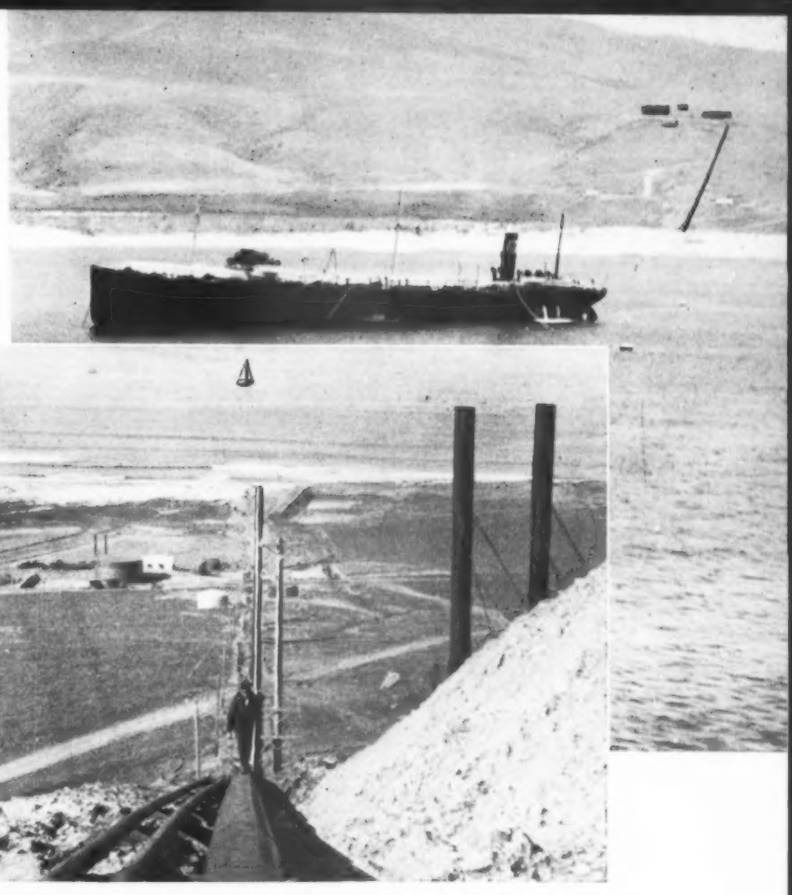
When Mr. Brantly left Peru, the returns were getting warm as though approaching something hot in the ground. The vicinity is called Aqua Caliente after the hotwater springs which occur around the perimeter of the fold.

NEW OUTLET for Asphalt Oil Sets Record

SHIPMENTS from Port Petrol already booked for the first six months of 1939 are greater than the volume handled during all of 1938. Port Petrol was completed March, 1938, on a site south of Point Sal on the Santa Barbara County coastline of California, was primarily built to afford an outlet for the Petrol Corporation's sizeable holdings in Gato Ridge field—recognized as one of the greatest asphalt oil reserves. Crude from the Santa Maria field is also loaded, and the port has broken all records for handling via sea loading lines the particular type of crude produced.

Pacific coast ports, the Atlantic seaboard, and Europe are being supplied by the organization, which loaded 17 tankers with a total of 1,013,088 bbl. of oil, an average of 59,593 bbl. per vessel, from March 9th to October 1st, 1938. Tankers loading at Port Petrol are met by the company's launch, which handles all of their mooring lines and carries the vessel's supplies. Oil is loaded on the vessels at 9,000 bbl. per hr. through 12 in. submarine lines.

The company's 13 to 15 deg. gravity Gato Ridge crude is unique in that it contains approximately 13 to 15 percent of gasoline and has a 70 percent asphalt content of 80 penetration. Its characteristics make it especially suitable for the production of roofing felts, shingles, and similar products. The Petrol Corporation is the largest independent producer and refiner of road oils and asphalts in the West. It is a completely independent unit in the industry, having no ownership affiliations.



Two views of the loading facilities at Port Petrol—small as the installation is, it has broken all records for handling via sea loading lines this type of crude.

Part of the Gato Ridge field, where the asphalt oil is produced.

BASRAH PETROLEUM

FULL TERMS of the concession granted to Basrah Petroleum Company, Ltd., are not yet revealed, but with one important exception are believed almost identical with those granted in 1932 to the B.O.D. Company, Ltd., which for six years has been conducting large scale exploratory drilling in its concession. The exception is dead rent. B.O.D. had to pay £100,000 the first year, £125,000 the second, £150,000 the third, £175,000 the fourth, and £200,000 annually thereafter. As these payments were on a gold basis B.O.D. actually paid over £1,250,000 sterling. Oil found is not of marketable quality and exploration continues. Basrah Petroleum will pay $200,000 annually on a gold basis.

NOVEL TANKER

UNIQUE, is the twin screw all-welded Diesel tanker DOLOMITE 4, built to full ocean classifications under Lloyd's rating. She is 300 ft. long, has a beam of 43 ft. 4 in., a moulded depth of 20 ft. and a gross tonnage of 5,500. Her main cargo tanks are lined with sheet nickel. DOLOMITE 4 is said to be the first freight ship to feature nickel cargo tanks. She will carry kerosene, gasoline, lye, molasses or grain.

BOOK REVIEW

South Texas Oil—written by Ira Rinehart, Earl S. Post, Frank N. Gardner and E. N. Redden and published 1938 by RINEHART OIL NEWS CO., Houston; spiral bound, 112 pages, 8½ in. x 11 in., with map of South Texas Gulf Coast oil region, $7.50.

This work is a concise and at the same time a comprehensive exposition of the present state and future prospects of the South Texas oil region, one of the greatest oil producing areas of Texas. The bulk of the literary text is contributed by Frank N. Gardner, who writes interestingly of the oil history of the area and its future, and gives a general review of South Texas geology together with a summary of production and reserves in the proven fields.

The statistical matter includes field nomenclature equivalents in South Texas, refineries and gasoline plants operating in the district, and detailed particulars of the 236 oil and gas fields which dot the map of the area. The editors have turned out a work which leaves little to the imagination and few questions unanswered about the oilfields of South Texas. It should be of great benefit to all operators, economists and students of the industry in view of the tremendously important rôle now played by South Texas in the United States oil industry.

PRICE POSTING Stabilizes Retail Gasoline Market in New Jersey

By Herbert I. Diamond

SINCE June 1st, when Standard Oil Company of New Jersey took advantage of the revised Fair Trade Law and the new Price Posting Act to place minimum prices on Esso and Essolene throughout the state, New Jersey has been drawing the close attention of gasoline marketers all over the United States.

New Jersey had long been a notorious sore spot in the gasoline retailing trade. As a natural consequence of enthusiastic price cutting, financial condition of many dealers was steadily deteriorating. Oil companies viewed the chaotic condition with alarm, yet hesitated to take corrective action under existing fair trade laws. Standard's legal department, for instance, felt that loopholes and indefinite wording created the potentiality of successful challenge, and the company would not enter on any program that might eventually be upset.

Dealers themselves—possibly actuated by an unofficial suggestion campaign on the part of marketers' representatives—were becoming aroused to the necessity of comprehensive legislation. First suggested remedy was a bill providing for a state-controlled price-fixing board. Endorsed by the New Jersey Gasoline Retailers Association, this proposed law quickly became the target of concerted opposition. Newspapers and the New Jersey Highway Users Conference raised the cry of government interference in private business and politics in every service station. Much credit for the defeat of this proposal is given to Paul J. Urban, president of Jersey Petroleum Marketers Association, who attacked with petitions urging the adoption instead of substitute legislation.

J. B. Henderson (top left), who leases and operates an Esso station in Newark, is secretary of the New Jersey Petroleum Marketers Association—the body responsible for lobby and pressure which put the law through legislature. He says that the law is fairly effective and a great improvement, but that the state does not do enough to enforce it—an occasional visit of the state inspector is all that it would take to make further arrests unnecessary.

Station operated by C. Sheppard, who has been retailing oil for 12 years—9 years with Esso and leasing an Esso station for three years—is delighted with the new law, which has increased his gallonage. Atlantic dealers, with prices midway between unbranded and price-posted gasoline, report a decrease in gallonage.

W.P. Staff Photos

Urban's program, which became law late in May, consisted of three distinct acts. The first amplified the Fair Trade Law by insertion of the words, "or the vending equipment from which said commodity is sold to consumers"—eliminating the prior objection that gasoline, being neither packaged nor labeled, could not obtain Fair Trade law protection.

The second was the so-called Price Posting Law specifically demands posting brand name and full retail price including all taxes, imposes a minimum 24 hr. duration on any posted price, prohibits selling at less than posted price outlaws "lotteries, prizes,

wheels of fortune, punch-boards, or other games of chance in connection with the sale of motor fuels." The law further provides for enforcement by the State Tax Department, and specifies revocation of the dealer's license for the second offense.

The third piece of legislation provided further funds by amending the Motor Fuel Dealer License Fee Act to a $5 annual license instead of the former $2.

Gulf stations maintain the fixed price—although without signing up as has Shell.

W.P. Staff Photos

The first and third laws were effective immediately; price posting, finally approved on May 18th, went into effect on June 1st. Overnight, New Jersey became part of the United States again. Standard's contracts were issued; signed, though not legally necessary, by every one of its dealers in the state. Prices as low as 12.9 cents per gallon on regular gasoline rose to 15.9 cents; there was not even a ripple of unfavorable newspaper comment, no noticeable objection on the part of the public, no recalcitrance among dealers. At the 15.9 cent price, dealers realize 3.5 cents per gallon profit; the margin on premium fuel is 4.0 cents.

Even retail stations not covered by contracts participated at once in the higher price level. A week later, Shell issued fair trade contracts; to be followed by Continental, Socony-Vacuum, Sun and Tide Water. Other refiners studied the law's operation for a time before following suit.

Only disturbing factor remaining is the price situation on third grade gasolines. Exclusive marketers of these products appear uninterested in the availability of fair trade law protection, and the major companies have usually not included third grade in their contracts. However, it is felt that the consumer acceptance of regular gasolines is sufficiently well entrenched to withstand price differentials between it and third grade.

The only substantial flaw in the New Jersey structure is that retail stations may have lost contract and truck business through the prohibition of selling below posted price, but industry executives philosophically point out that such business is often mythical with the average retailer.

Three months passed satisfactorily—and then, on September 13th, the first violater was apprehended in Newark convicted of selling 10 gal. for $1.40 despite a posted price of 15.9 cents. The Crosstown Garage paid its $50 fine, contemplates no appeal from the decision. This test case is expected to set a precedent for future enforcement, and it is not believed that any other dealer will endeavor to upset the law. A second conviction has since been obtained.

The oil companies literally have their fingers crossed. Happy about the whole thing, they are unwilling officially to declare the experiment successful. Executives prefer to adopt an attitude of watchful waiting. They think that the air-tight New Jersey laws would be sustained in a court contest; and though the burden of complaint and enforcement is not placed upon the companies, active support would be offered in the law's defense if necessary.

Meanwhile, fair trade law protection has been invoked in some parts of New York state with apparently equally successful results. Retail Petroleum Dealers' Association of California reports satisfaction with its fair trade legislation, generally similar to New Jersey's but permitting trade associations to initiate prosecution of offenders either civilly or criminally.

Extension of Fair Trade contracts into other states is not planned, a spokesman for Standard declared, although company policy would approve such action for the benefit of dealers in areas where price conditions became chronically bad. From the retailer's standpoint, Wilmer R. Schuh, president of the National Association of Petroleum Retailers, has expressed the opinion that a widespread adoption of Fair Trade contracts is not expected.

Future action probably will be initiated among retailers' organizations. Even now, a Philadelphia group formed to obtain legal relief against price wars has enrolled over 1,200 dealer-members in eight months.

ITALY'S Fuel Resources Inadequate

By S. E. Prof. Ing. Umberto Puppini

Combined Natural Fuels, Substitutes, Synthesis and Greater Use of Hydro-Electric Power Fall Short of Requirements.

IN CONSIDERING their fuel problem Italians must ascertain Italy's actual annual consumption of solid and liquid fuels; the total known quantity of these fuels in the Italian subsoil; what quantity of this available fuel can be obtained annually; the amount of fuel obtainable from sources other than Italy's subsoil; and what measures can be taken to assure autarchy in this division of Italy's national economy that also vitally affects national power.

Italy's present annual requirement of solid fuel may be stated as the equivalent of 12,500,000 tons of bituminous coal for railroads, industries, navy, and for domestic heating. In 1914 the requirement was 11,500,000 tons. This increase of only 1,000,000 tons in annual consumption of solid fuel in 23 years is explained by the phenomenal development of the nation's hydro-electric industry, which in 1914 produced 3,500,000,000 kw.-hr. of electric power, and now produces 14,400,000,000 kw.-hr., and also by her increased consumption of liquid fuels. In 1914 Italy required only 800,000 tons of petroleum products a year; now she uses 3,000,000 tons, of which 700,000 tons are white products (gasoline, etc.) and the rest heavy products (gas oil, lubricants, etc.).

These are current needs and do not include any reference to what would be needed in wartime, nor the normal increase in gasoline consumption, which is now much smaller than in Germany, France or England.

The reserve of solid fuel in the Italian subsoil is small. Counting everything: the anthracite of Thuile, the coals of Sardinia and Istria and all deposits of lignite, there are in actual sight only 500,000,000 tons. Geological studies now in progress will almost certainly reveal new beds of fuel that may perhaps increase reserves to some 900,000,000 or 950,000,000 tons. Even so, this looks pitiably small compared with the 31,000,000,000 tons of France, the 57,000,000,000 in European Russia, the 189,000,000,000 in England, the 208,000,000,000 in Poland and the 280,000,000,000 in Germany. It must further be considered that Italy's coals are of inferior quality; the scant billion tons of solid fuel in her subsoil is really equivalent to only about 500,000,000 tons of good foreign coal.

From this modest reserve Italy is now extracting 2,000,000 tons a year. The Corporation of the Extractive Industries has evolved a program for increasing the native coal production to 4,000,000 tons a year. Italy dare not go beyond this, even if she could. She must husband this precious resource to the fullest possible extent against national contingencies which may arise in the future. As regards national resources of crude petroleum, more than 20,000 tons a year cannot be anticipated.

In sum, therefore, this is Italy's fuel balance sheet so far as it reflects what may be expected in three or four years when she has fulfilled the plan for exploitation of her home resources:

	tons
Annual needs:	
Coal	12,500,000
Liquid fuels	3,000,000
Subsoil will produce:	
Coal	4,000,000*
Natural liquid fuels	20,000

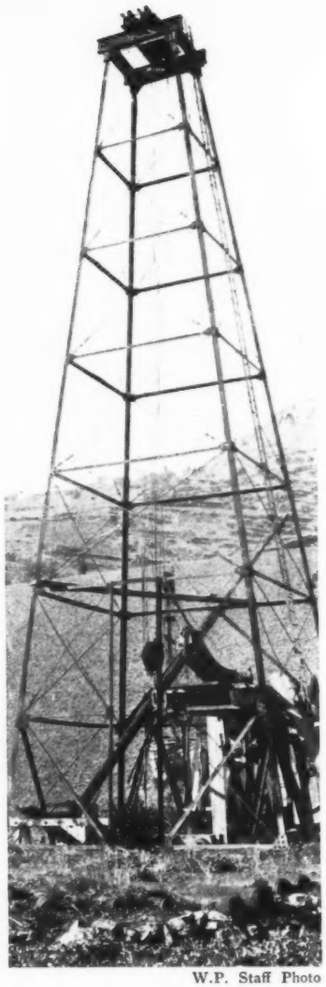
*Bituminous equivalent.

Italy will produce only a third of the coal she needs, and an insignificant fraction of the natural oil she uses. What can she do about it?

She may seek to acquire participation in foreign oilfields. The A.G.I.P. already owns the Prahava enterprise in Roumania, which produced 600,000 tons in 1934, but is now in a decline. It also has an arrangement with the Iraq Petroleum Co., by which it obtains considerable quantities of oil. But these sources are subject to political risks and draw heavily on Italy's supply of foreign exchange. More secure are the Albanian oilfields from which she may obtain 300,000 tons of low grade crude a year.

She may also seek to discover oil in Italy and its dependencies; she has vigorously prosecuted the search and is continuing to do so, but has not yet succeeded in identifying any petroleum deposits of real commercial importance anywhere.

She may also seek to substitute products of national origin for products derived from foreign petroleum. Among these is the natural gas that has been encountered in her search for oil or water. Italy's autarchic plan for 1940 calls for obtaining from these gas fields an amount of gas equivalent to 10,000 tons of gasoline; this gas will be utilized in part for industrial and domestic purposes and in part for automotive fuel on the roads of Lombardia and Emilia.



W.P. Staff Photo

Canadian rig east of Nicosia, Italy.

She can also piece out her automotive fuel by the use of wood charcoal, burned in the gasogene engines of busses and trucks, but the charcoal for this purpose must not be obtained at the expense of other wood products, of which she now produces barely enough. Her use of the gasogene engine is limited to the supply of waste wood that cannot be used for any other purpose and would otherwise rot in the forests. From this source she may obtain the equivalent of 30,000 tons of gasoline, sufficient to operate 6,000 vehicles.

Of more importance is the mixture of alcohol with gasoline in the ratio of one to five. In this way she can find a substitute for 120,000 tons of gasoline. The present plan is to obtain five-sixths of this alcohol

W.P. Staff Phot

Properties of Societa Petrolifera Italiana at Salsomagiore field, Italy.

from sugar beets and the rest from sorghum. It cannot be denied that the production of alcohol requires some coal, and it also cannot be denied that the apparent cost of fuel alcohol greatly exceeds the cost of imported gasoline. But notwithstanding this supposedly economic foolishness the place of fuel alcohol in Italy's national autarchy is absolutely justifiable in view of the foreign exchange situation and her general problem of national security.

The same justifiable principle of autarchy impels her to make the best possible use of other materials that in other more fortunate lands would not be noticed—low grade residues, tars, rock distillates, and the inferior Albanian crude oil. For this purpose she has erected two plants, one at Bari and the other at Livorno, which have begun to function and will produce around 240,000 tons of gasoline; these plants are designed to treat tars and other low grade materials, and might be put to work on the synthesis of petroleum from coal and lignite.

This matter of obtaining gasoline and other petroleum products by a process of synthesis from coal has now passed into established practice. It is being done in France, England, and especially in Germany, where numerous plants operating by the Bergius, the Potte-Broche and the Fischer processes are annually turning out 810,000 tons of gasoline. It is true that synthetic gasoline is being produced in Germany at what superficially appears to be a cruel cost. But even so, the cost of synthetic gasoline is still less than that of fuel alcohol, which Italy has found it advantageous to produce in view of her exchange situation; the economic sacrifice is not too great in the face of her need to become autarchic in matters affecting national defense.

While Germany may well provide herself with synthetic petroleum, with Italy the situation is different. The Germans have immense reserves of coal and lignite, and so they have not the slightest difficulty in supplying their synthetic petroleum factories with raw material, even though it takes 4½ or more tons of bituminous coal to make a ton of gasoline. Italy has no such reserves of solid fuels. Before she puts up plants for making synthetic petroleum she has to consider whence the raw material is to come. She cannot, or should not, draw on her slender reserves of coal that could substitute the foreign coal that is now imported at a high cost in foreign exchange. Any program of oil synthesis must be based on materials that are unsuitable for direct industrial use, such as bituminous shales and asphalt rocks, and low grade lignites; these latter can either be distilled at low temperature to produce tar, or gasified.

Completion of Italy's autarchic plan as a whole by 1940 depends to some extent on success in perfecting processes for utilizing these low grade materials, particularly furnaces for distilling her asphaltic and bituminous rocks.

When all has been said and done, counting up the values obtainable from Albanian oil, oily rocks, lignite, alcohol, wood charcoal, natural gas, native petroleum, we find that by 1940 Italy's autarchic plan will yield annually the equivalent of 700,000 tons of gasoline.

With this in mind, we can look again at her national fuel balance sheet as it will appear in 1940:

	Tons
Annual needs:	
Solid fuel	12,500,000
Liquid fuels	3,000,000
Domestic production:	
Solid fuel	4,000,000*
Combustible liquids	700,000†

*Bituminous coal equivalent
†For internal combustion engines

The difference between what Italy needs and what she is able to supply from her own resources is great. She still has one visible means of improving the situation, or rather a means of preventing it from becoming worse in view of future industrial expansion. Her potential output of hydroelectric energy is 30,000,000,000 kw. hr. a year; she is now producing 14,400,000,000 kw. hr. By 1940 she will be producing 5,000,000,000 more, which will enable her to save 3,500,000 tons of coal with which to meet the expanding needs of her national industry.

With Italy autarchy in fuel is not an end in itself, but a means to two ends: first, to avoid the outgo of exchange which, if not compensated by an equivalent of exports, will eventually impoverish the nation; and, second, to constitute a means of defense against hostilities that may take the form of open war, or the less tragic but no less disastrous form of sanctions. Autarchy therefore means liberty in the best sense of the word.

The first of these ends may be achieved in part by compensating one sector of the national economy by increasing the burden on another sector, but no question of internal compensation or balance can be allowed to imperil the second end. The nation must at all costs be prepared to meet at least the initial exigencies of war. It is indispensable to store petroleum against a time of sudden and great need, and while Italy must scrape and save every ounce of fuel that does not involve the outgo of foreign exchange she still has to provide for national insurance in the form of adequate stored oil. In so far as plants for petroleum synthesis can be considered as consuming exchange, the A.G.I.P. has found that a plant to produce 100,000 tons of synthetic petroleum costs 500,000,000 lire or 5,000 lire per ton of capacity. The cost of building and filling concealed oil storage, with all necessary equipment, is 830 lire per ton. For what Italy would put into a plant to produce 100,000 tons of oil a year from coal she could buy nearly a million tons of foreign oil, and for another 500,000,000 she could build 250,000 tons of oil tankers.

Needless to say she will use her resources of money and materials to the best possible advantage, having in view both immediate and eventual necessities.

(*Note*:—This article is an abridged translation of an address to the Italian Association for the Advancement of Science by the president of Azienda Generale Italiana Petroli. It is an eminently objective statement of the fuel problem that confronts the Italian nation.—ED.)

IMPROVING Employee Morale and Relations . . . On a Basis of Knowledge

For this Purpose a Considerable Amount of Money and Varying Degrees of Effort Are Expended by Oil Companies on House Organs.

ABSENCE of personal contact is the chief distinguishing characteristic between big business and little business. And nearly every oil company has come to recognize that to minimize the gap between executives and personnel, company and dealer, management and public, is a prime requirement of successful operation. The desirable way of doing this—with personal visits by the company president—is almost totally impracticable. Therefore the printed word must bring the personality of the company to every far-flung employee and trade contact. At the same time, a number of other objectives are being accomplished.

House organs as used by oil companies are of several distinct types: (a) employee publications (b) dealer publications (c) consumer publications (d) publications for stockholders (e) special-purpose publications and (f) publications that combine two or more of these functions. The number of house organs issued by any one company is not governed by company size or marketing scope, for a house organ is always somebody's idea: "Let's put out a magazine!" or "Why don't we have a newspaper like so-and-so does?" There are invariably any number of good and logical reasons why: once published, if anything approximating the expected results shows a tendency to appear, the organ is firmly entrenched.

Starting a house organ is an easy matter. It needn't be costly or elaborate; it can be tried out in conservative, inexpensive manner. In most oil companies, house organs are simply an added job for the advertising or sales promotion department, with one or more people—who may do no other work—responsible for the publications. Despite the fact that turning out a first class house organ is a job that should have undivided attention, in comparatively few companies is a single publication one person's exclusive responsibility. In some organizations, the editorial staff is tied down to the desk; restricted in outside contact to correspondence, and that only with division heads. Such policy cannot create a virile house organ—especially one for dealers and salesmen. One editor interviewed stated that the success of his publications was due entirely to the absolute freedom he was permitted for field trips. "It freshens my viewpoint to see what is going on, and constantly to be calling on dealers," he said. "Even though my company does not require it, I never speak to a dealer in any territory without first consulting division personnel. They take much more interest when they see the results of their help in the magazine."

In a few instances, the preparation of house organs is left largely to outside sources. ESSO ROAD NEWS, a consumer publication, is entirely produced by the firm which makes the maps. ESSO OILWAYS, an industrial publication, is largely created by the advertising agency, since much of its material requires extraneous research unconnected with petroleum products marketing.

Material published in various house organs is usually left to the discretion of the editor, subject to a slight measure of executive control.

Distribution of company publications is handled in various ways. Some companies address employee copies individually, but the trend is to bulk shipment to all offices with either hand distribution or a self-help stack. Re dealer publications, advocates of distribution by salesmen or drivers point to economy and the added interest of the house organ when placed directly in the dealer's hands. Theoretically, it gives the salesman an opportunity to go through the publication with the dealer. Mail advocates are equally emphatic in saying that the dealer expects to receive important communications in his mail, and why chance human forgetfulness just to save postage? In most cases, distributors are supplied in bulk for whatever method of distribution they prefer in their own territories.

To industrial customers and prospects the mails are used, with more or less frequent checkup of mailing lists. This puts a dual responsibility on salesmen (1) to add new names constantly and (2) to send notifications of old names that should be removed. No matter how many convenient forms a salesman is supplied, he has a natural resistance to book-work and feels that he has been employed to sell, not to fill out forms. The successful keeping of mailing lists in good condition depends entirely on the cooperation that district managers and supervisors are able to get from individual salesmen; and regular pep-up memos on this subject will undoubtedly continue as long as the industry itself. It is no solution of the problem to send a letter to recipients asking if they want the publication or not. The highest record that has ever been established has been a 60 percent return, and no company would want arbitrarily to cross off 40 percent of its prospects because they didn't respond. Too, the people who say "Don't send it any more" may be the very ones most desirable to keep hammering at. The trend seems to be toward a house-cleaning of the complete list at least once every two years, with local sales representatives required to check every name for continuance or discontinuance.

Another house organ problem is, what to do with requests to be put on the mailing list, a situation encountered frequently by technical and semi-technical publications. If all requests were filled, the print orders would be tremendous; yet to refuse may be potentially detrimental to future business. It is a ticklish proposition no matter how handled. General procedure gives single copies to schools, colleges and libraries; turns down requests for duplicates to such organizations. Requests from individuals are usually referred to the sales-manager of the division where they originate, for okay or refusal.

THE LAMP (Jersey Standard) received so many requests that a subscription price of $1.00 a year was set for those not normally entitled to receive the publication without charge. This figure approximates the cost of six issues plus postage—at least, there is no substantial profit or loss—and it apparently does not discourage people who want the magazine. Other companies are not inclined to make a charge, feeling that no matter how profitable the figure might be, it would require setting up special routines that would interfere with necessary operations.

While no company is niggardly about distributing copies of its house organs to the fields for which intended, waste circulation is carefully watched, especially on the larger press runs.

Consumer house organs are usually distributed by the dealer, and occasional check

by sales staff sees that the dealer receives sufficient quantity, yet not enough to waste. The only publication that departs from these practices is Sinclair's elaborate PICTURE NEWS which is charged to the dealer at a definite amount per copy. Actually the charge is not made to defray the expense, but to assure effective distribution. Sinclair prefers to mail individual copies direct to names supplied by the dealer: the total charge is less than cost of postage, envelopes and addressing. Copies that the dealer wants to distribute personally cost him slightly less per copy, but return a greater yield to the company.

Accounting methods on distributing the costs of house organs vary in detail from company to company. In the majority of instances, they are charged to general advertising or sales promotion accounts, although some firms break down the costs and charge each division with the number of copies used in its territory. Specialized publications such as those going to marine trade, are usually charged to the sales expense of the department concerned. In other instances there is a special budget and separate ledger account for each publication

EMPLOYEE HOUSE ORGAN

Let's take a look at some of the house organs. First group is the employee publications. These—or any other house organ, for that matter—need not be elaborate, as is evidenced by THE ESSO RAZORBACK, published by and for the Arkansas Sales Division of Standard Oil Company (La.). Here is a sales employees' house organ in its basic form: a convenient, periodical method of supplying bulletins, psychologically using the magazine format to get away from the bulletin effect. THE ESSO RAZORBACK has a folder cover of durable mediumweight stock. Into this the mimeographed sheets that make up each issue are placed, the whole stapled with two wire clips from an ordinary office stapling machine. Interest and variety are secured by the use of different colors of mimeograph paper—six colors besides white are used in the 19 pages of a representative issue. Drawings, sketches, cartoons and hand-lettered captions relieve nearly every page. Included are inspirational messages, reports on sales standings, instructions, timely reminders, a page of gossip.

Next step up in the cost scale is photo-offset reproduction. THE GULF WAY, of which some 650 copies go monthly to men in the New York Sales Division of Gulf Oil Corporation, is a sprightly example. THE GULF WAY replaced, in April, 1936, a series of sales bulletins; only most urgent matter is now bulletined. There are many items concerning individual accomplishments of salesmen and their dealers, liberally illustrated with snapshots that the salesmen supply; reports on sales standings, current advertising campaigns, and the like. Usual size is 16 pages, 8½ in by 11 in., self cover; two colors throughout—black and Gulf orange.

Another photo-offset publication is RICHFIELD RITE-UPS (Richfield Oil Corporation of New York). Some 1,800 copies of RICHFIELD RITE-UPS go to all company employees and distributors.

Tabloid newspaper style is used for a sales employee house organ in PROGRESS PARADE (Tide Water Associated Oil Company, San Francisco). Makeup is on five columns, page size 12 in. by 18 in. Usual size is eight pages. A substantial dull-finish stock is used. The issue examined secures a rotogravure effect by printing in brown ink on India paper.

Favorite style on sizable editions is the printed magazine, of which THE ESSO MARKETER is an example. Standard Oil Company (N. J.) issues 11,000 copies monthly to sales personnel. Page size is 6 in. by 9 in.; usual bulk, 48 black-and-white pages plus two-color cover. Pleasant typographical arrangement and liberal photographic illustrations mark the book physically, while the editorial program is well-defined with 13 major topics slated for feature treatment in every issue. These topics include (1) existing sales policies, changes and new policies (2) reducing cost of marketing (3) instructions on new marketing methods (4) reports on sales contests (5) news stories on successful merchandising (6) testimonials from customers (7) information on specific products (8) sales plans for the month (9) personnel changes (10) safety campaign (11) personal health (12) current advertising programs and (13) individual accomplishments and company service awards. THE ESSO MARKETER constantly sells employees on the company, presents constant evidence of the management's interest in the individual employee. For example, when the outdoor season began, the health article by a company doctor was titled "Exercise," discussed the possible effects of strenuous exercise on people in the oil business, suggested ways and means to get most rest and enjoyment out of the summer months.

To promote the family spirit some companies issue publications of the gossip type—a strict development of the country newspaper. Such publications are eagerly awaited by employees. This type of house organ can be beautifully handled, as is SHELL NEWS, issued monthly by the Personnel Department of Shell Petroleum Corporation, St. Louis—a 5½ in. by 8½ in. pocket size book, 32 pages, with colored self cover.

DOINGS IN GENERAL is a 32-page and cover 7 in. by 10 in. magazine issued by the

House organs have done much to propagandize clean rest rooms to dealer and public alike.

The Flying
Red Horse
THE FLYING RED HORSE MAGAZINE
ING FORWARD: PLANS FOR SNARING SPRING BUSINESS
ISHED BY THE SOCONY-VACUUM OIL COMPANY, INC. • MARCH 1938

The Flying Red Horse—most elaborate of house organs—suspended publication after a brief trial.

Personnel Department of General Petroleum Corporation. It was established in 1925 and discontinued in the depths of 1931. But the employees remembered the magazine and in January 1937 publication was resumed at the request of the Employee Representation Committee; 4,700 copies are issued monthly. Each issue contains at least one feature article of educational value and general interest, telling either of some company department or of some industry which uses the company's products. The gossip content is held strictly on a news plane.

To keep the atmosphere of a small-town company is the expressed objective of TEXACO TOPICS, a 24-page 10 in. by 15 in. gossip sheet issued at bi-monthly intervals. Photographs dot the pages. The Continuous Service Honor Roll is a standing feature. The three-column pages are solidly filled with 8-point news letters from every division, district and department.

TEXACO TOPICS is a consolidation of many local, departmental gossip magazines, accomplished in 1930 for dual objectives of economy and impressing every employee with the size of the company. Magazine format was used until 1932, when the present newspaper tabloid size was instituted. 20,000 copies of each issue are distributed. Editorial work at the New York office is held to a minimum, as no attempt is made to rewrite or alter style.

Similar is THE ESSO REFINER, edited at Bayway for the eastern Standard Oil (N.J.) refineries. This, too, is a tabloid in newspaper form, 12 in. by 18 in., running six pages per issue and published every three weeks. Boosts for company products are dropped in here and there. Sports activities of employees are reported. Added feature is a "Sale, Rent or Exchange" column of classified advertisements, accepted from employees without charge, where everything from fishing reels to summer bungalows finds its way. The ads are run with box numbers only. 12,000 copies of THE ESSO REFINER are printed every issue. Like others of similar character, this paper goes to annuitants as well as current employees.

Keeping employees sold on the company is a constant function of employee papers. For instance, THE STANOCOLAN — published bi-weekly for Baton Rouge refinery employees by Standard Oil (La.)—devotes half of a 9 in. by 12 in. page to dramatizing the fact that all workers get vacations with pay.

However, while there are many gossip publications for employees, a number of managements feel that company interests can be as well served by limiting employee mention to activities directly connected with company functions, with the outside limit of personality material set at the photograph of a dinner or sales meeting. Such a magazine is SOCONY-VACUUM NEWS, distributed to 40,000 domestic employees every two months. It is a standard 9 in. by 12 in. page size, averages 20 black-and-white pages, with color cover. It was started in February, 1935, taking the place of the old VACUUM OIL NEWS which had been discontinued during the depression years. A company executive says, "Our employees undoubtedly do a lot of reading, and we have found them anxious to do some reading about the company they work for". Officially the objective is stated as "improving employee morale and relations, increasing loyalty to the company on a basis of knowledge." There is no editorial page, no preachments of any sort. Articles deal with the company, its policies and international progress, and employees in relation to the company. A page of each issue is devoted to quotations from letters received by the company. Stories on personnel advancements are accompanied by brief outlines showing how the person promoted has worked his way up through the company. Annuitants are publicized in every issue.

DEALER ORGANS

Most companies that produce a magazine of this caliber send it also to stockholders or dealers; on the other hand, dealer publications are generally provided to employees. Reason-why for all dealer house organs is to maintain relationship, supplement the sales staff, present company merchandising plans in authentic and complete form, offer timely selling suggestions, and build company prestige. Principles and theories are sugar-coated by embodying them in stories of other dealers' operations. The clean rest room campaign, for instance, currently featured in nearly every dealer magazine, takes on much more force when presented in the words of dealer Morriss, who has found such-and-such specific results to come from clean toilets and offers pictures to prove his point.

The dealer's viewpoint should not be overlooked. He gets magazines from the companies whose products he sells. If he is a desirable prospect he may receive many publications from other sources as well as competitive oil companies. He gets one or more of the free-circulation service station trade magazines. Besides all this, he may be a paid subscriber to yet another trade newspaper or magazine. Where does he get the time to read all these publications—or does he?

Many investigations—both frankly company-sponsored and apparently independent—have delved into this question. The answer is that the alert progressive dealer at least glances through all the publications that come to him. He may or may not read each one carefully—he does turn the pages and literally dares the editor to catch his attention. It has been established that the dealer finds a special interest in the publication of the company whose products

he sells; he is inclined to give this a little more careful attention. And that justifies the purpose of the house organ.

Probably as outstanding a magazine as has ever been issued to dealers was Socony-Vacuum's THE FLYING RED HORSE, of which seven monthly issues were placed in dealers' hands until publication was suspended in March, 1938. This was a 16-page and cover picture book, of the size and format of LIFE. Replete with admirable photographs, it was favorably received by dealers. Nearest to an official reason for suspension is that 1938 was "not considered a propitious time for the continuance of the experiment . . ."

Notwithstanding which, the trend is to the use of many photographs. SHELL PROGRESS (15,000 monthly, Shell Union Oil Corporation) uses pictures liberally and dramatically in accordance with the old Chinese proverb that one picture is worth a thousand words. In a recent issue, a two-page feature was devoted to a discussion of the effect of liquor on driving. Rather a timeworn subject—but even non-readers could get its theme in 10 seconds flat from the four photographs of a man and a woman: the first drink at the bar, a warming up of the party, the man slouched over a table, finally he drunkenly assists her into an auto. Around the photos, in color, a line sketch of the subsequent wreck as he bends anxiously over her broken, disheveled body.

"I think of SHELL PROGRESS," says editor W. M. Thompson, "as a monthly paper for a community—the community of those who market Shell products—a community held together by the common interest of a job. But we cannot rely upon the community of interest alone. We want SHELL PROGRESS to be the best-looking publication that goes into the home of a garage mechanic, and we expect it to hold its own among the magazines that executives read."

Commencing with the August issue, the page size of SHELL PROGRESS increased to that of a fashion magazine—9¾ in. by 12¾ in. The cover is now 120-pound stock, and the pages 80-pound instead of the former 70-pound paper. Photographic treatment is to be more extensive, and it is planned that special services of outside feature writers will be engaged in addition to the three field representatives now on the staff. Another departure in format will be the use of fractional-page advertisements, simulating those in consumer magazines, to feature various products and services of the company. Its 24 pages are usually black-and-white but occasionally have additional color.

Separate editions of SHELL PROGRESS are published in their respective territories by Shell Petroleum Corporation and Shell Oil Company, each with special local material. General features are interchanged between editors, and color plates for the cover designs are swapped in the interest of economy. The Pacific coast edition is 16,500 copies monthly, while 28,500 copies of the midwest edition are printed bi-monthly.

Tydol's BETTER BUSINESS is also published in two editions—at Tulsa and at New York. The eastern issue runs an average of 16 pages each month, the mid-continent edition 8 to 12; both in two colors throughout. Tulsa picks up full page plates of features from New York. This house organ puts emphasis on merchandising, sales training, development of sales methods and merchandising follow - through. BETTER BUSINESS was a four-page folder when first issued in September, 1931. Results were so satisfactory that size rose to 16 pages by 1934. Now, occasional issues have 20 or 24 pages. Several pages every month carry dealer achievement items under the head "News Notes From Here and There." One man is designated in each of the six sales districts to supply a short story—100 words or so, with a snapshot. Tydol finds this a more practical plan than having one regular correspondent in each district.

RICHFIELD MERCHANDISER (Richfield Oil Corporation of New York) follows a utilitarian publication plan. There is no definite schedule. Issues come out when merchandising occasion requires, vary in size from single sheets to 24 pages. "Dealers know there's something doing when they get our magazine," says B. N. Pollak, Richfield advertising and sales promotion manager. "We give them only bread-and-butter facts".

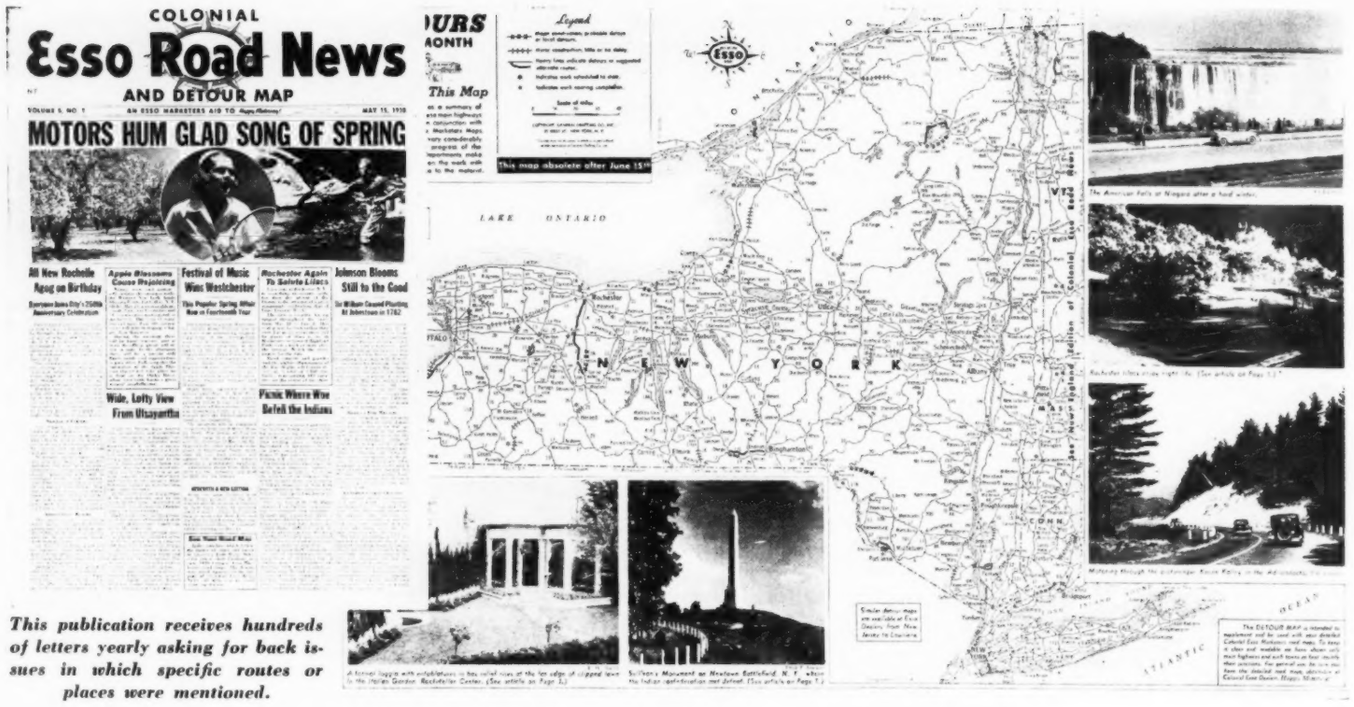
A little niche of distinction belongs to General Petroleum Corporation's MOBIL MAGAZINE, sent monthly to some 5,000 dealers. It has 16 pages and cover, is noisily printed in two colors. The technique is definitely poster: nearly full-page photographic illustrations accompanied by two-inch-high hand-lettered captions. In fact, there seems to be a prejudice against the use of anything smaller than 72-point for headlines. Typical is this extract from a recent issue:

The flaming caption is "What . . NO coffee?" Dominating two-thirds of the left-hand page is a scowling station attendant pointing to an empty cup. You know he's a station attendant because of the leather bow tie he's wearing. The diminutive little woman holding a coffeepot shrinks in the lower right corner. The story starts, "I had a run-in with the wife one morning, and did I get bawled out? I'm all ready for breakfast and we're plumb out of coffee. I hit the ceiling because breakfast without my Java makes no sense at all to me. 'Why don't you keep a record of what's needed in this house?' I yells. 'Suppose I ran my business the way you run this house. Where'd I be?' 'You'd be right where you are, Smarty,' she comes back at me. 'Remember passing your competitor's place and seeing Colonel Drigg's car up on the lube hoist? He was a customer of yours and if you'd been such a champion record keeper you would have followed him up and got that job.' Well, sir, that floored me." And so on and on, with half a dozen instances of what dealers are doing on followups. Change the opening incident and the theme, and you have the next story. You may not like the type of journalism; but there is no denying that MOBIL MAGAZINE is doing its job well. To turn out this sort of thing consistently takes far more effort than a straight magazine.

THE TEXACO DEALER is a 12 in. by 16 in., eight-page tabloid, printed in black and white, usually with photographic front page. Interior makeup is magazine style, with many pictures. Upon occasion, the advertising department supplies a color insert tying up with current campaigns. 60,000 copies are mailed directly to dealers each month—in an envelope. But 40,000 copies of New Jersey Standard's THE ESSO DEALER are self-mailers, as also is GULF NEWS, another tabloid. THE ESSO DEALER has 8 pages in newspaper makeup. GULF NEWS, printed in two colors, combines news makeup with advertising pages.

Sinclair's BIG NEWS, distributed by salesmen, runs to eight pages in strict tabloid newspaper format; even the paper is a white newsprint. American Oil Company's AMOCO NEWS likewise follows newspaper format. Basic motive of this publication is

The Compass has been issued to the marine trade for 17 years.


COLONIAL

Esso Road News

AND DETOUR MAP

MOTORS HUM GLAD SONG OF SPRING

All New Rochelle Agog on Birthday

Apple Blossoms Cause Rejoicing

Festival of Music Wins Westchester

Rochester Again Yo Ho Ho's Lilacs

Johnson Blooms Still to the Good

Wide, Lofty View From Utsayantha

Picnic Where Wise Befell the Indians

This map absolete after June 15th

LAKE ONTARIO

NEW YORK

ATLANTIC OCEAN

This publication receives hundreds of letters yearly asking for back issues in which specific routes or places were mentioned.

to let dealers know of other dealers' doings, and coincidentally to project company policies. Salesmen distribute 70,000 copies each month. Rotogravure is sometimes used.

STOCKHOLDERS

House organs designed for stockholders—and also generally made available to employees—naturally differ in character from the dealer publications. The general endeavor is to do an institutional job, impressing the importance and scope of company activities. Representative of such magazines is Gulf Oil Corporation's THE ORANGE DISC, of which 36,000 copies are published bi-monthly. Average size was 24 pages in two colors with up to full process color on the cover; last year the size was stepped up to 32 pages, less formal page layouts adopted with heavy photographic treatments. Interesting features of recent issues have been multi-page photo stories such as the production of the magazine itself, and a day in the life of a fuel oil delivery salesman. There are factual articles on company products, their manufacture and use; brief company news items, selections from the mailbag; employee sports activities; many pages of photographs.

THE TEXACO STAR, a 25-year-old magazine, formerly had a publication schedule of from 6 to 10 copies a year; for 1938, four quarterly issues are planned. Average content is 24 black and white pages with color cover; average issue 100,000. For the last three years, says editor Philip C. Humphreys, practice has been to devote each issue entirely to one subject, with little mention of The Texas Company. This policy hit an all-time high for altruism in the Christmas, 1937, issue which reprinted famous holiday classics—from Dickens' Christmas Carol to Virginia O'Hanlon's "Is there a Santa Claus?" letter—contained no mention of Texaco whatsoever, and drew hundreds of praiseful fan letters. Typical, too, was the recent Marine Number, including a pictorial history of shipping, discussion of petroleum tanker development, another series of photos explaining tankship construction, and the company's marine sales setup.

The function of this editorial policy is conceived strictly as one of goodwill building. This indicates what other house organs may be, after as long a life. THE TEXACO STAR was originally purely an employees' paper. Stockholders were added in 1923.

Occupying a unique position among all oil company house organs is THE LAMP (Standard Oil Company of New Jersey). Its prime objective is to be an official voice of company policy: to educate on, interpret, and explain company actions; to present company attitudes on all questions affecting industry; to do all these things persuasively so that readers' opinions may be influenced. Because of the authenticity of its statements, THE LAMP is frequently quoted in the general press; by request, some 100 leading newspapers and magazines receive advance proofs of important articles that are to appear. The 65,000 bi-monthly copies go to stockholders and key employees. Stockholders must specially request THE LAMP: a sample copy is sent to new stockholders with a subscription card; when share holdings are sold, the name is instantly removed from the mailing list. Photographs are extensively used in THE LAMP'S 32 pages, as also is color: but the entire general effect is distinctly conservative and dignified. There is, too, a flavor about each article—no matter how unrelated or informative it may be—as though the Board of Directors were letting the reader in on a grave secret. And to achieve that is something of an art in itself.

SPECIAL-PURPOSES

The fourth general group of house organs issued by oil companies consists of publications with special purposes: such, for instance, as THE COMPASS issued by Socony-Vacuum's Marine Sales Department. This, incidentally, is the oldest of Socony-Vacuum publications, with a 17-year record of bi-monthly issuance. The size is 12 pages, self cover, printed in two colors with a process reproduction of a vessel on each front cover. 15,000 copies of THE COMPASS go to the marine trade all over the world. Editorial content describes technical phases of new ships, always with a tagline to the effect that Gargoyle Marine Oils are used.

International in scope, too, is THE TIDE WATER WORLD, whose 8,000 copies (quarterly) find their way to 76 countries. Page size is 10½ in. by 12½ in.; each issue 20

pages, self cover; produced in two colors by photo-offset on linen-finish paper. There is some technical content. The distributors who receive the magazines in each country send them on to dealers as well as selected customers. General objectives are to supplement personal contacts, to build company prestige and to give product and performance information.

Recently, the Shell Petroleum Corporation commenced an elaborate series of brochures in 8½ in. by 11 in. size under the title, PANORAMA OF LUBRICATION. Actually these are no less than simplified textbooks, described on the flyleaf as "an educational series dedicated to executives, engineers, salesmen and students whose interest in the subject of lubrication demands simplicity."

It is a growing practice to issue technical organs. To The Texas Company again goes the honor of having the oldest of these—LUBRICATION— now in its twenty-fourth year. The masthead sets forth the purpose: "A technical publication devoted to the selection and use of lubricants." Each issue is devoted to one industry or one problem; the text, illustrated with pictures, diagrams and tables, gives specific lubrication details but never mentions any Texaco product by name. Only the inside covers and outside back cover carry any advertising. Every fact is microscopically checked so that each article is complete, new and authoritative; with the result that the articles are held in high esteem by readers.

This careful checking is equally characteristic of other companies' technical publications. Sinclair Refining Company mails 60,000 copies of THE SERVICE FACTOR six to eight times a year—a four-page newspaper tabloid containing pictures of industrial applications of lubricants.

ESSO OILWAYS, by Standard of New Jersey, contains a number of articles on various industries in each issue, ties every story down to details and discussions on specific lubricants. Of this, 21,000 copies are distributed every month. A company spokesman says, "This is our answer to the question of how to advertise industrial lubricants. Confronted with innumerable trade and technical publications all claiming effective coverage of their own fields, we found it out of the question to use them all, from the standpoint of cost. Esso OILWAYS, we know, goes to exactly the customers and potential customers we want to reach."

OIL-POWER, by Socony-Vacuum, has a different outlook. Following the theme of the subtitle, "A magazine of industrial romances," each issue is devoted to two or three stories: the operations of industries without any reference to their lubrication requirements. Inside and back covers may carry Socony-Vacuum advertising unrelated to the subject of the issue; there is generally a purely institutional editorial. Subjects are selected without consideration of possible business, have included the manufacture of watches, skis, rubber, safety fuses, sponges, and panama hats. "Everybody in industry is interested in other peoples' problems," a Socony-Vacuum executive explains, "and these non-technical discussions for technical men are read with a great deal of interest, create a friendly feeling for the company that sends them." OIL-POWER is not used as a puff sheet.

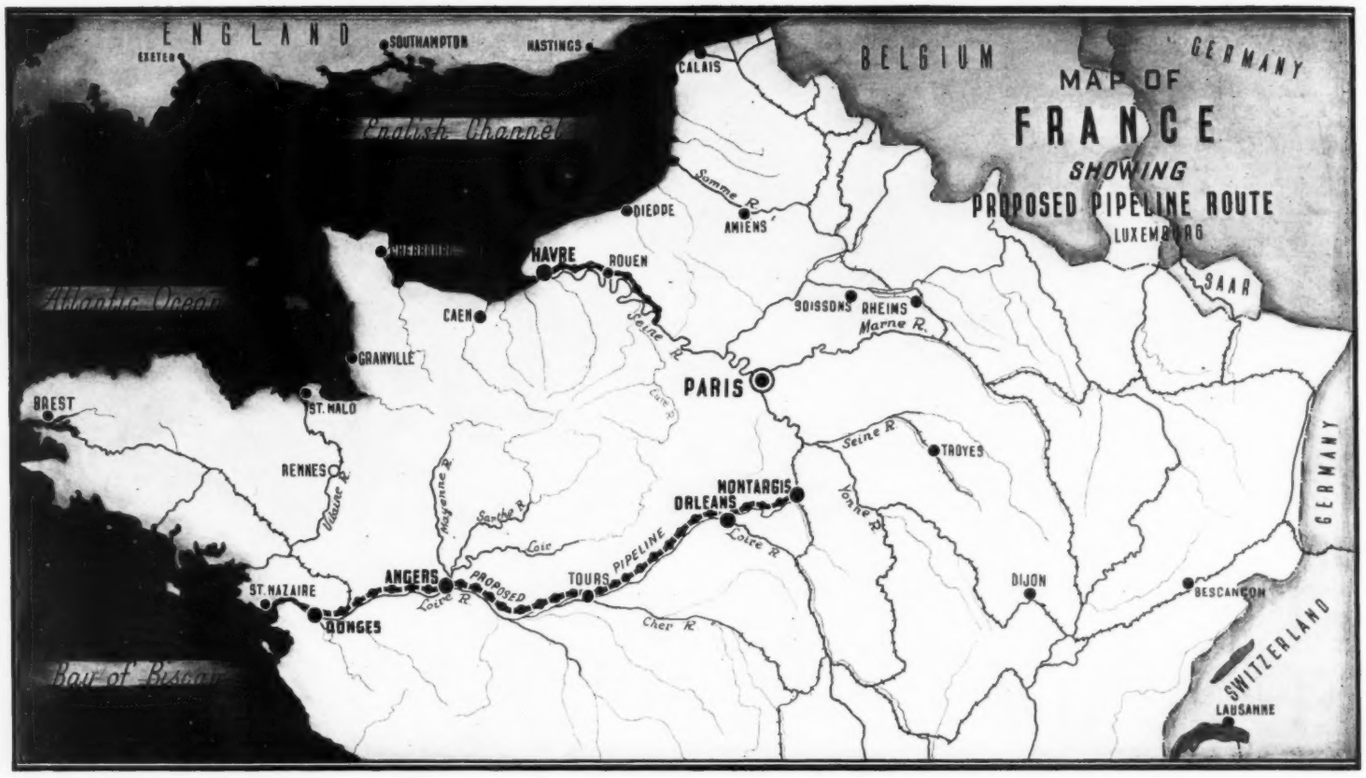
CONSUMERS

The final group of oil company house organs includes those designed especially for the consumer. Gulf disposes of 2,000,000 copies of FUNNY WEEKLY every week, provides them free to dealers along with a rubber stamp to imprint the station name on the front page. Front and back pages of the 4-page tabloid are serial comics; the inside pages contain puzzles, a short story and other featurettes as well as a dominant advertisement for some specialty or service.

During the summer of 1938, 7,000,000 copies of ESSO ROAD NEWS were distributed through dealers. There are five issues, monthly from May 15th to September 15th, in the New England and New York Colonial-Beacon territories; two other editions—middle Atlantic and Southern—have six issues each, from May 1st to October 1st. Content suggests places to visit, tells of special current attractions worth driving to, features a large road map detailing all detours and road construction in progress during the month, but carries no straight advertising.

Most elaborate of the consumer house organs is Sinclair's PICTURE NEWS, printed in two colors by the duotone process which gives multi-color effect. Ten issues of this four-page tabloid are produced during the year. Each copy is imprinted front and back with the dealer's name and address, and a picture of the owner and his station are included. A standard size space carries an advertising message, selected for each issue by the dealer from a service book of 80 available setups. In many of these, provision is made for inserting the dealer's own prices at time of imprinting; 1938 is the fifth year of PICTURE NEWS. 5000 dealers subscribe to one million copies of each issue. Recently a questionnaire checkup—on a letterhead that simply read "Picture News"—was sent to 10,000 random names on the list of consumers. A 30 percent response was received, with 97 percent of the respondents admitting reading the paper, 95 percent asking to have it continued, and 88 percent correctly identifying the dealer who sent it to them. And maybe you think Sinclair dealers don't like that!

Technical magazines for distribution to industrial lubricant users and prospects, plant engineers and similar people give valuable information and advice on lubrication problems without the stigma of being a puff for a particular brand of oil.



Map showing tentative route of proposed pipeline and existing line from Havre through Rouen.

FRENCH PIPELINE to Follow Waterways

By C. M. Chambers

DURING the summer of 1938, Louis Pineau, Under-Secretary, and his advisors on the O.N.C.L. were voted a free hand to take the necessary precautions to guaranty gasoline supplies in central and eastern France in case of war. It was decided that the logical plan to double the quantity now carried by tankers on inland waters would be to construct a 12 in. pipeline from the seaport refineries at Donges, on the Atlantic coast, to storage at Montargis, 270 mi. distant. Although the exact route has not been decided on it will probably follow the valley of the Loire river, running almost on a line between the two points and with only one serious obstacle, that of the juncture of the Mayenne and the Sarthe rivers with the Loire at Angers. From Orleans to Montargis the route is prolonged by the Orea Orleans canal and at Montargis this canal is bifurcated to form the Briard and Loing canals, each communicating to important rivers. Montargis is a natural turn-table for dispatching petroleum products in any direction by road, rail, canal and river—or by other pipelines.

Cost of constructing the pipeline is estimated at Fr. 150,000,000, or about $4,250,000. As a protection against attack the pipeline is to be laid three to four feet below the surface of the ground and pumping stations will be likewise underground. The 12 in. diameter of the line will permit an annual capacity of at least 1,000,000 metric tons, or about 8,500,000 bbl., of gasoline annually. Construction was to start early in October.

To warrant the huge expense to be incurred by the construction of this line it must be remembered that the army of France is entirely motorized, and without oil supplies the military forces would be helpless. The question now is being raised what to do with this new means of transportation during normal times? What place shall it occupy when the existing facilities are adequate for commercial demands? And, who shall finance the project? The law, as passed, permits the government to assume the entire cost—but some believe that it is quite certain that it will not do so. If not, then no doubt bonds will be issued to cover all or at least a major portion of the cost and private capital invited to participate—that is, the oil companies which sell their products to the state. In this way the line would be built at a minimum expense to the government.

MIDDLE EAST OIL MAP

REPEATED requests have been received for copies of the oil map of the Near and Middle East which accompanied our issue of July, 1938. Copies of this issue are no longer available, but the map—which was specially prepared from information supplied by and under the direction of WORLD PETROLEUM—is obtainable separately from the International Map Company, 90 West Street, New York.

INTERNATIONAL REPORTS

ROUMANIAN owners are to order motor vessels from Italy on a basis of 60 percent payment in Roumanian oil and 40 percent in cash. The deal is to be made through the government.

NIGERIA—known since the latter part of the 19th century to have extensive bituminous asphalt deposits—has once more drawn the attention of oil interests. Geologists of the Royal Dutch-Shell group have been prospecting in that country for several months, but matters there are still in the initial stage.

BOLIVIA and Paraguay's century-old frontier dispute in the Chaco region has been settled. Paraguay holds the military gains of the recent war, but does not get a foothold in Bolivia's oilfields. The frontier is now within 75 mi. of Villa Montes, Bolivia's military headquarters in the Chaco, but more than 100 mi. from the foothills in which are located the Bolivian oilfields of Camiri and Sanandita.

AUSTRALASIAN Petroleum Company has been organized with a capital of £1,000,000 to explore the oil-bearing possibilities of Papua and the Mandated Territory of New Guinea. The participating companies are Vacuum Oil Propriety, D'Arcy Exploration Company, Ltd. (Anglo-Iranian) and Oil Search Ltd. The new company acquires licenced areas already held in these regions by two of the companies, and each group has subscribed £135,000 as initial working capital.

ANGLO-AMERICAN Oil Company Ltd. is to start immediately with the drilling of a second test well 800 yds. northwest of its discovery well at Dalkeith, Scotland. It will be recalled that the latter was tested for a combined flow of 5,000,000 cu. ft. of natural gas, at 700 lb. per sq. in., from four sands from 2,000 to 2,152 ft. Over a five day period the oil sands at 1,750 ft. flow eight to ten barrels daily. The well is now shut down, awaiting delivery of special pumping equipment.

CALIFORNIA Arabian Standard Oil Company's Dammam, No. 2 Well, Saudi Arabia, after being deepened to a 4,700 ft. zone, has been brought in with large potential of 35 deg. gravity oil, which the company has limited to 1,500 to 2,000 bbl. a day to conform with good practice in curtailment of production. Dammam No. 4 is undergoing production tests and likewise has prospects of becoming a good producer. This subsidiary began test drilling in 1935, with 10 wells put down in an area in eastern Saudi Arabia. Early depths between 2,000 to 3,000 ft. did not provide production sufficient to prove commercially significant and subsequently one well, Dammam No. 7, was drilled deeper, to 4,700 ft. bringing in an allowable of 2,000 bbl. of 34.8 degree gravity oil per day. Dammam No. 2, is about one-and-a-half miles southeast of the discovery well in this deeper zone. The east coast of Saudi Arabia as an oil producing area has the advantage of affording relatively close water transportation. Prior to the California Arabian Standard Oil Company obtaining a concession in 1933 to conduct operations there, this land was comparatively unknown geographically and no systematic geological survey had been made.

GULF EXPORT PRICES FOR MAJOR OIL PRODUCTS

Products		Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2
		Cents Per Gallon				
GASOLINE:	U.S. Motor	4⅝	4⅝	4½	4¼	4¼
	64/66-375 E.P.	4⅝	4⅝	4½	4½	4½
	59 Octane and below	4⅝	4⅝	4½	4¾	4¾
	65 Octane and above	4⅞	4⅞	4¾	4¾	4¾
AVIATION GASOLINE:	Gulf Export in cargo lots	8¼	8¼	8¼	8⅛	8¼
KEROSENE:	44 w.w.	4¼	4¼	4¼	4⅛	4⅛
	41/43 w.w.	4	3⅞	3⅞	3⅞	3⅞
	41/43 p.w.	4	3⅞	3⅞	3⅞	3⅞
GAS OIL:	43 Diesel Index and below	3½	3½	3½	3½	3½
	43/47 Diesel Index	3½	3½	3½	3½	3½
	48/52 Diesel Index	3½	3½	3½	3½	3½
	53/57 Diesel Index	3⅝	3⅝	3⅝	3⅝	3⅝
		Dollars Per Barrel				
FUEL OIL:	Bunker C	75	75	75	75	75
	Cargo lots	60	60	60	60	60
	Diesel oil	1.55	1.55	1.55	1.55	1.55
		Cents Per Gallon				
LUBRICATING OIL:	Bright Stock No. 8	21½	21½	21½	21½	21½
	Bright Stock No. 6½	21½	21½	21½	21½	21½
	600 Warren E	20½	20½	20½	20½	20½
	600 Unfiltered s.r.	15½	15½	15½	15½	15½
(New York Export Market)	650 Unfiltered s.r.	17½	17½	17½	17½	17½
	600 Flash s.r.	18	18	18	18	18
	630 Flash s.r.	20½	20½	20½	20½	20½
	Neutral 200 No. 3	22½	22½	22½	22½	22½
	Neutral 150 No. 3½	21½	21½	21½	21½	21½
(South Texas Export Market)	Red oil 500 No. 5-6	7¾	7¾	7¾	7¾	7½
	750	8¼	8¼	8¼	8¼	8¼
	1200	8¾	8¾	8¾	8¾	8¾
	Pale oil 500	7¾	7¾	7¾	7¾	7½
	750	8¼	8¼	8¼	8¼	8¼
	1200	8¾	8¾	8¾	8¾	8¾
		Dollars Per Barrel				
CRUDE OIL:	East Texas delivered at Gulf for export	1.40	1.25	1.40	1.22	1.22

FREIGHT RATES

	Oct. 12		Oct. 19		Oct. 26		Nov. 2	
	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean
Gulf-No. Atl.	18c.	18c.	18c.	18c.	18c.	19c.	19c.	19½c.
Gulf-UK. Cont.	12/-	12/6	12/-	12/6	13/9	13/9	12/-	12/-

Construction work has been resumed on the pipeline of Mene Grande Oil Company, Gulf Oil subsidiary in Venezuela. The line runs from the Officina field to Puerto La Cruz, on the Caribbean, and is to be completed about September 1st, 1939.

Foreign Oil Legion

T. C. J. BURGESS has resigned from his position as chairman of London and Thames Haven Oil Wharves Ltd. and ALFRED C. ADAMS has been appointed to the position. Mr. Burgess had been chairman since 1931, when he succeeded the late LORD KYLSANT. He has been joint managing director with Mr. Adams since 1919., A. E. SAUDY, secretary of Parent Petroleum Interests, has been appointed joint managing director of Thames Haven.

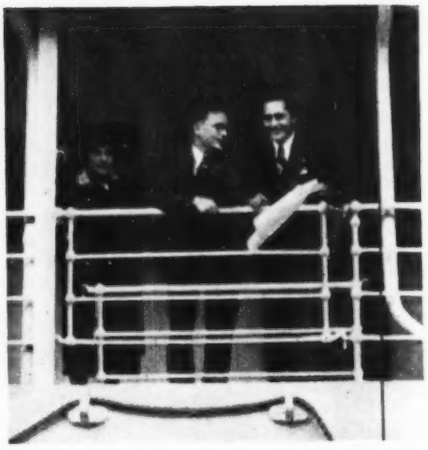
CHESTER CREBBS, president of Mene Grande Oil Company, arrived in New York by plane from Venezuela October 10th on company business. He will remain in the United States for about two months before returning to Maracaibo and Caracas. Mr. Crebbs is well-known for his likeable personality and is a keen amateur yachtsman. At his home he has a varied and valuable collection of trophies which he has won racing with vessels of the Star class, and already has come in first two out of the necessary three times to win a beautiful loving cup, valued at several hundred dollars, which is a product of Tiffany's, famous New York jewelers.

Chester Crebbs, seated on the steps of his house at the Bella Vista compound, Maracaibo.
W.P. Staff Photos

J. B. FREELAND, chief engineer of the Bureau of Mines in British Columbia, spent several days in Los Angeles during October discussing with oil men the development of his province's petroleum resources. With an appropriation of $50,000 Mr. Freeland faces the problem of a preliminary survey of some 10,000 sq. mi. of generally promising territory in the inaccessible valley between the two major ranges in the northern part of the province. The region at present considered is not unlike the oil producing area in Wyoming, is 6,000 to 8,000 ft. above sea level and lightly timbered, but difficult to geologize from surface indications. Some geologists have expressed the view that an economical procedure indicates spotting the region first with the magnetometer then following with the tortion balance and later reflective surveys or soil analysis. Aerial mosaics are already available as a general guide.

E. V. WINTERER and ROLLO TURNER, geologists for the Superior Oil Company, embarked on the Matson Liner MARIPOSA at Los Angeles on October 14th, for an indefinite assignment on company affairs in New Zealand. It is understood that at least a preliminary geological survey will be made at the southeast end of North Island, and that Mr. Winterer will then return to Los Angeles for a preliminary report on the general outlook for prospecting, while Mr. Turner proceeds with detailed observations. Most of the prospecting on North Island heretofore has been in the southwest, whereas the southeast area has more sedimentary beds and more folding, and appears to offer excellent opportunities for geophysical surveys in addition to the more evident structures.

FELIX MENDOZA, of Bogota, Colombia, who has been studying petroleum engineering in the United States for the past three years, returned to Colombia, sailing from New York on the United Fruit ship, TALAMANCA on October 12th. Mr. Mendoza will proceed directly to Bogota where he will act in an advisory capacity for the government's petroleum department. He obtained a degree in Petroleum Engineering from the University of Oklahoma in 1937, was offered an honorary graduate assistantship at the University and went to work for the Magnolia Petroleum Company in the Fitts Pool as district engineer. His practical education in the oil business was furthered by a stay at the Dallas offices and at the Beaumont refinery of this company. Shortly after he assumes his post in the petroleum department, Mr. Mendoza hopes to make a tour of oil operations in Colombia, where considerable activity in the development of new fields, leasing and pipeline construction are under way.



W.P. Staff Photos

Felix Mendoza, right, and Dr. Eduardo Ospina-Racines, Colombian vice-consul in charge of petroleum affairs in New York, who had come to bid him bon voyage.

M. SHISKANOV, former drilling master of the Lenin group of fields, Russia, has been appointed assistant chief of Baku production. Because of the inefficient operation of the Soviet oilfields, 100 dispatch engineers of Glavneft (Oil Combine) Moscow, together with representatives of Glav-

F. J. McGovern, who started in the oil business in Tampico, Mexico, in 1920 and has had wide engineering experience in the industry, has been put in charge of The Lummus Company's newly-opened Chicago office.

gormash (machine building combine) Glavtrub (pipe makers combine) and of Kaliber (combine of part manufacturers) have been ordered to proceed to the fields to make a survey of all possible means of mitigating the situation immediately.

JUDSON WOOD, executive vice-president of Mene Grande Oil Company, returned to Caracas, Venezuela, on board the SANTA PAULA, October 15th, after a two month vacation in the United States. He was accompanied by Mrs. Wood and their two children, Judson Jr., and Teresa. Mr. Wood, who is laid up from an infected foot, left New York straight from a hospital bed despite the fact that the doctors had advised him to remain inactive for some time longer. Of his 18 years with Gulf Oil Company interests, Mr. Wood has spent the last 14 years in Venezuela. Before that he was active for about two-and-half years on the company's coastal concession in Colombia, where they drilled two holes at San Acidres, near Covenas—terminal for the new pipeline under construction. Mr. Wood had also spent some time in Mexico prior to working in South America.

LEWIS E. FRENSLEY, of Socony Vacuum Oil Company of Colombia, arrived in New York with Mrs. Frensley on board the SANTA ELENA, October 17th, en route from Barranquilla.

DR. DIOGENES ESCALANTE, Venezuelan Minister to the United States, was entertained at luncheon in the Wall Street Club by WARREN W. SMITH of Caracas, Venezuela early in October. Other guests at the luncheon included JOSEPH E. POGUE, well-known oil economist and vice-president of Chase National Bank, L. P. MAIER, vice-president of Andian National Corp., Ltd. Dr. Escalante made an important speech in which he said that Venezuela needs and welcomes foreign capital and foreign technicians to develop its natural resources. "The investor who will come to us on a basis of equality and fairness has nothing to fear in Venezuela," said Dr. Escalante, adding "We do not see why that partnership on equal basis, from which all would profit to the same extent, should not be an agreeable and lasting one."

H. E. LINAM, president of Standard Oil Company of Venezuela, returned to New York from South America on board the Grace liner SANTA ELENA, October 17th.

DAGFINN PAUST—well-known for his work in connection with the International Tanker Owners Association—was recently honored with a knighthood of the first class of the Royal Order of St. Olav by His Majesty the King of Norway.

LT.-COL. J. H. M. GREENLY, president of the Institute of Fuel, forecast a world shortage of oil within 18 years at the annual conference of the Institute in London. Present known resources of petroleum total 4,066,000,000 tons (29,680,000,000 bbl.) and research is badly needed, he said. Rapid discovery of new fields is keeping pace with production, but it is probable that world oil reserves would not withstand the ever-increasing demands for natural liquid fuels. A shortage is almost certain to be felt within measurable time. He directed attention to America where $15,000,000 are spent on research and development in the refining of petroleum, and said that it was about time Britain paid the same attention to her coal supplies. At modern rates of consumption Britain's store of coal in the earth would last another 860 yr., but this is a relatively trifling period compared with coal reserves in other countries. Russia's proved and probable reserves would last over 35,000 yr. and Canada's for another 25,000 yr. Even in Germany there is an estimated coal reserve to last 2,000 yr.

Britain's lack of native oil supplies also prompted the Minister of Transport, L. BURGIN, to call upon the motor industry for an engine that would run on British-produced fuel. Various grades of hydrocarbon oils could be produced by the hydrogenation of coal, and Britain should follow Germany's lead, he suggested.

R. C. KIDNER, president of the Institution of Automobile Engineers, said: "We as designers feel that the lead must come from the Government."

CARL E. FEHRENBACK, Continental Oil Company, has been honored for his excellent night photographic study of the company's Tepetate, La., plant—reproduced on the front cover of WORLD PETROLEUM, September, 1938. This picture since has been adjudged the best industrial photograph of the year by the National Photographers Association.

Russell Palmer

RUSSELL PALMER, publisher of WORLD PETROLEUM and associated journals, recently returned to his home in California, via New York, on the NORMANDIE after a 17,000 mi. trip through Spain. The essence of his seven month stay behind the Franco lines is a two-hour documentary film in the Kodachrome natural color process—entitled, "Defenders of the Faith."

Mr. Palmer's book, "They Died Standing," is being published soon. Besides containing an excellent account of the war and of his several visits to Spain, his book surveys the economic status of the country under the Nationalist regime.

Val R. Wittich, international sales representative Oil Center Tool and other petroleum equipment companies, who is soon to leave on a trip to the oilfields of Colombia, is pictured on the right. Next to him is A. J. Penick, president, K. T. Penick, secretary-treasurer, and B. V. Fisher, vice president, of Oil Center Tool Company. On the left is C. A. Dunlop of the Humble Oil and Refining Company.

WORLD OIL

All figures furnished direct to WORLD PETROLEUM by governments, except where otherwise specified

U. S. BARRELS

	October 1937	November 1937	December 1937	January 1938	February 1938	March 1938	April 1938	May 1938	June 1938	July 1938	August 1938	Preliminary Figures Sept. 1938
United States	110,911,000	104,206,000	106,579,000	106,007,000	94,662,000	106,524,000	102,702,000	98,674,000	94,277,000	102,898,000	106,165,000	**98,000,000**
Soviet Union[4]	17,600,000	16,923,000	17,600,000	17,647,000	13,591,000	15,984,000	17,850,000	17,580,000	18,540,000	18,200,000	18,000,000	**18,200,000**
Venezuela	17,979,227	17,044,016	17,096,298	15,271,902	13,792,479	15,109,040	13,696,219	15,994,400	16,302,150	14,912,555	16,616,673	**16,300,000**
Iran[5]	7,075,122	6,821,616	5,999,642	5,907,458	6,414,470	8,284,215	7,090,486	6,975,256	5,792,228	5,338,990	6,950,000[1]	**6,920,000**
Netherland India	4,766,689	4,626,395	4,671,582	4,245,587	4,235,422	4,721,147	4,568,899	4,764,193	4,573,725	4,518,455	4,451,011	**4,520,000**
Roumania	4,313,000	4 162,000	4,198,000	4,099,000	3,751,692	4,182,000	4,090,000	4,169,000	4,015,000	4,115,000	4,075,736	**4,110,000**
Mexico	4,372,808	4,211,293	4,349,415	4,141,977	4,016,000*	1,226,368*	1,912,493*	2,301,995*	2,374,815*	2,000,000[1]	2,300,000[1]	**2,000,000**
Iraq	2,663,244	2,645,099	2,431,532	2,670,844	2,385,464	2,717,278	2,592,996	2,332,746	2,653,579	2,806,903	2,829,528	**2,621,547**
Colombia	1,811,759	1,797,625	1,824,956	1,784,638	1,508,487	1,841,882	1,642,195	1,819,689	1,826,136	1,826,848	1,870,013	**1,781,000**
Trinidad	1,393,317	1,300,485	1,349,908	1,378,021	1,304,819	1,438,436	1,418,825	1,481,285	1,431,476	1,500,171	1,505,959	**1,514,893**
Argentina[1]	1,360,000	1,365,000	1,370,000	1,378,000	1,289,000	1,380,000	1,349,000	1,382,000	1,346,000	1,349,000	1,360,000	**1,358,000**
Peru[2]	1,484,761	1,428,079	1,486,121	1,365,152	1,224,437	1,474,364	1,296,090	1,343,259	1,303,536	1,335,623	1,328,143	**1,280,691**
Bahrein[6]	847,988	749,354	805,236	805,800	707,379	737,164	692,403	620,746	661,602	699,176	713,149	**714,349**
Burma[7]	704,736	631,584	640,195	616,522	496,306	633,644	635,903	667,346	679,368	638,000[1]	635,000[1]	**650,000**
Brunei[8]	351,711	376,487	405,623	409,592	381,052	445,194	428,829	445,505	425,184	453,393	448,219	**478,080**
Canada[2]	342,452	341,517	408,580	457,408	413,158	480,803	464,316	566,086	537,654	693,332	817,706	**850,000**
Great Germany: Old Reich[13]	288,926	272,665	277,551	268,028	257,967	355,684	342,387	329,688	326,842	346,435	342,484	**347,000**
Ostmark[14]	17,101	18,620	20,850	25,620	28,160	30,070	29,100	32,845	30,000[1]	29,000[1]	31,000[1]	**29,000**
Poland	325,940	318,360	325,940	318,928	293,232	327,077	315,768	324,803	315,381	314,000[1]	318,000[1]	**327,000**
Japan[9]	210,228	214,330	211,436	218,594	214,191	214,820	207,522	216,078	216,707	216,707	217,525	**216,000**
Ecuador	182,053	176,252	178,776	187,525	171,138	191,746	181,331	190,542	188,712	192,360	193,634	**189,087**
British India[10]	181,089	197,043	210,360	196,697	132,164	197,792	196,543	198,872	192,656	195,000[1]	200,000[1]	**197,800**
Sarawak[11]	133,684	126,439	131,901	137,497	126,578	137,281	133,248	137,824	132,240	132,007	107,102	**123,476**
Egypt[12]	97,203	95,082	94,509	91,927	84,974	94,545	88,555	89,935	84,998	83,412	143,978	**157,533**
Albania[15]	.....	.....	.....	42,400	39,200	42,400	41,000	42,400	72,300	46,049	4,998	**51,000**
France	42,339	42,639	42,368	41,560	40,840	43,589	42,839	48,545	43,189	43,574	43,000[1]	**42,000**
Hungary	.....	1,930	11,980	13,744	12,461	13,976	13,775	18,691	26,018	25,888	30,900[1]	**41,000**
Czechoslovakia	10,865	12,297	11,734	11,070	10,437	12,158	10,731	10,960	10,159	9,333	11,015	**11,000**
Bolivia	10,736	11,751	12,810	10,302	7,128	9,100	8,800	9,000	8,790	9,500	9,200[1]	**8,500**
Italy	9,233	8,565	8,493	9,048	7,969	9,612	9,459	9,563	8,646	9,378	9,057	**9,000**
Other Countries[16]	6,000	5,800	6,000	6,000	5,400	6,000	5,800	6,000	5,800	6,000	6,000	**5,800**
WORLD TOTAL	179,493,211	170,131,323	172,760,796	169,764,841	151,605,004	168,895,385	164,057,512	162,783,252	158,401,892	168,944,089	171,734,030	**163,053,756**

[1] Estimate.
[2] Includes natural gasoline production.
[3] International Petroleum Company and Lobitos Oilfields Ltd. figures combined.
[4] Russian Sakhalin included with U.S.S.R.
[5] Anglo-Iranian Oil Company Ltd. figures revised—fuel oil returned to the ground has been deducted.
[6] Bahrein Petroleum Company Ltd. figures.
[7] Does not include Assam or Punjab, which are listed together under British India.
[8] British Malayan Petroleum Company Ltd. figures.

Official Crude Oil Production Figures for 1932 to 1937 (Revised)

	Daily Av. Jan.-Aug. 1938	Daily Av. Jan.-Aug. 1937	Total Jan.-Aug. 1938	Total Jan.-Aug. 1937	Total 1937	Total 1936	Total 1935	Total 1934	Total 1933	Total 1932
United States	**3,333,000**	3,501,674	**909,909,000**	955,957,000	1,277,653,000‡	1,098,516,000	996,596,000	908,065,000	905,656,000	785,159,000
Soviet Union	**569,934**	552,140	**155,592,000**	150,733,661	201,856,661‡	199,635,921	184,008,033	175,635,783	155,596,429	155,927,997
Venezuela	**505,478**	495,143	**137,995,418**	135,174,193	187,675,477	155,270,840	148,809,057	136,098,681	117,113,940	115,615,782
Iran	**218,546**	213,210	**59,673,103**	58,206,514	78,109,001	62,977,950	57,520,488	57,902,092	54,440,075	49,516,697
Netherland India	**148,712**	149,207	**40,598,440**	40,733,455	54,112,933	47,961,744	45,307,913	45,107,828	41,234,498	37,988,913
Roumania	**134,093**	144,700	**36,607,428**	39,503,000	52,170,000‡	63,532,846	61,270,072	61,849,306	53,919,708	53,651,978
Mexico	**81,589**	122,792	**22,273,648**	33,522,171	46,455,687‡	41,027,915	40,240,563	38,171,946	34,000,830	32,805,496
Iraq	**86,487**	85,042	**23,610,885**	23,216,583	30,603,660‡	29,913,150	27,410,983	7,639,849	1,094,915	871,840
Colombia	**58,245**	54,444	**15,900,888**	14,863,203	20,297,543‡	18,756,110	17,597,655	17,337,900	13,156,126	16,415,214
Trinidad	**47,523**	41,974	**12,973,885**	11,458,792	15,502,989	13,237,030	11,671,224	10,894,363	9,561,353	10,126,121
Argentina	**44,656**	44,472	**12,191,000**	12,140,910	16,354,717	15,457,960	14,297,025	14,021,901	13,690,556	13,138,747
Peru	**43,777**	47,642	**11,951,295**	13,006,374	17,459,112	17,593,069	17,056,555	16,314,381	13,257,318	9,899,265
Bahrein	**23,266**	19,633	**6,351,768**	5,359,696	7,762,264	4,644,635	1,264,807	285,072	31,377	902
Burma	**20,704**	22,531	**5,652,089**	6,151,066	7,847,553	7,587,718	7,181,113	7,278,859	7,114,311	7,073,437
Brunei	**14,341**	12,051	**3,915,048**	3,289,791	4,397,038	3,296,938	3,302,905	2,705,350	2,035,656	1,200,026
Canada	**19,342**	16,892	**5,280,463**	4,611,510	2,995,025	1,507,931	1,447,204	1,410,895	1,145,333	1,044,412
Great Germany: Old Reich	**10,683**	8,326	**2,916,515**	2,272,155	3,148,300	3,076,858	2,967,438	2,204,402	1,656,602	1,594,807
Ostmark	**970**	495	**264,795**	162,555	221,266	50,092	44,347	27,965	5,765	804
Poland	**10,455**	10,287	**2,854,189**	2,808,440	3,799,862	3,869,575	3,901,881	4,011,336	4,174,079	4,219,634
Japan	**7,100**	6,784	**1,938,144**	1,851,847	2,487,841	2,403,072	2,294,878	1,872,837	1,504,412	1,683,439
Ecuador	**6,180**	5,950	**1,686,075**	1,624,258	2,161,436	1,942,467	1,731,785	1,636,619	1,619,902	1,597,641
British India	**6,255**	6,066	**1,707,524**	1,653,150	2,161,653	1,978,329	2,037,810	1,921,863	1,628,803	1,743,878
Sarawak	**4,276**	4,400	**1,167,253**	1,200,570	1,655,565	1,547,882	1,776,593	1,942,591	2,206,815	2,329,733
Egypt	**3,370**	3,158	**919,857**	862,006	1,163,267	1,262,666	1,255,151	1,527,252	1,653,535	1,071,976
Albania	**1,398**	1,626	**381,747**	444,000‡	591,677	219,693	41,218	17,500	11,437	9,212
France	**1,425**	1,378	**389,136**	376,089	507,067	534,063	529,664	700,000	786,366	755,146
Hungary	**730**	Nil	**196,453**	Nil	13,910	100	Nil	Nil	Nil	Nil
Czechoslovakia	**355**	325	**96,863**	88,832	122,790	126,603	136,580	177,797	121,695	125,603
Bolivia	**294**	322	**80,320**	87,833	10,302	104,746	163,295	157,875	111,973	41,907
Italy	**299**	324	**81,732**	88,510	114,801‡	129,653	128,615	162,449	213,534	242,563
Other Countries	**193**	192	**52,800**	52,400	70,000	37,100	32,300	64,000	54,100	73,300
WORLD TOTAL	**5,403,676**	5,573,180	**1,547,209,761**	1,521,500,564	2,039,482,399	1,798,200,656	1,652,023,152	1,517,143,692	1,438,797,443	1,305,926,470

‡ Preliminary.

L PRODUCTION

Figures in U. S. barrels of 42 gal.—Conversion ratios used are weighted averages for individual countries

METRIC TONS

	Oct. 1937	Nov. 1937	Dec. 1937	Jan. 1938	Feb. 1938	March 1938	Apr. 1938	May 1938	June 1938	July 1938	Aug. 1938	Preliminary Figures Sept. 1938
United States	15,014,349	14,106,674	14,427,914	14,345,022	12,814,670	14,420,469	12,916,610	13,357,804	12,762,583	13,939,606	14,507,243	**13,100,000**
Soviet Union[4]	2,410,000	2,320,000	2,410,000	2,421,000	2,440,000	2,192,000	2,448,000	2,411,000	2,543,000	2,497,000	2,470,000	**2,497,000**
Venezuela	2,630,106	2,518,696	2,526,422	2,256,820	2,038,197	2,232,753	2,023,972	2,363,588	2,409,066	2,205,195	2,455,545	**2,409,000**
Iran[5]	936,657	903,096	794,277	782,073	849,195	1,096,726	938,691	923,436	766,818	706,815	920,000[1]	**917,000**
Netherland India	639,824	620,994	627,058	602,510	568,513	633,711	613,275	639,489	613,923	606,504	597,478	**607,000**
Roumania	590,822	570,137	575,068	559,973	512,175	570,239	558,362	568,874	548,139	561,775	556,415	**561,000**
Mexico	649,110	625,192	647,196	614,902	596,200*	182,061*	283,921*	341,745*	352,555*	297,000[1]	355,000[1]	**297,000**
Iraq	357,099	354,666	326,030	358,118	319,853	364,344	347,948	312,771	355,803	376,415	379,395	**351,508**
Colombia	253,904	250,540	254,349	248,730	210,242	256,700	228,878	253,615	254,514	254,669	260,629	**248,200**
Trinidad	196,076	183,012	189,967	193,923	183,622	202,425	199,666	208,456	201,446	211,113	211,928	**213,185**
Argentina[1]	194,000	194,000	195,000	196,300	183,600	198,000	192,200	196,900	191,900	192,200	193,800	**193,500**
Peru[5]	196,761	189,250	196,942	180,911	162,263	195,383	171,759	178,010	172,745	168,725	176,006	**167,718**
Bahrein[6]	116,036	102,539	110,186	109,751	95,450	100,478	94,457	84,723	90,435	95,428	97,279	**97,479**
Burma[7]	97,299	87,199	88,388	85,120	69,240	91,765	87,796	92,275	93,797	87,900[1]	87,800[1]	**89,100**
Brunei[8]	46,120	49,500	53,110	54,623	49,965	58,376	56,230	58,416	55,552	59,464	58,772	**62,688**
Canada[2]	43,262	43,143	51,614	57,783	52,193	60,739	58,649	71,511	67,934	87,586	103,298	**109,000**
Great Germany: Old Reich[13]	41,614	39,272	39,977	38,604	37,155	51,517	49,314	47,485	47,075	49,897	45,007	**49,900**
Ostmark[14]	2,443	2,570	2,850	5,816	5,253	5,820	5,627	4,900	5,800[1]	5,600[1]	5,850[1]	**5,600**
Poland	43,000	42,000	43,000	42,075	38,685	43,150	41,658	42,850	41,607	41,000[1]	42,000[1]	**43,000**
Japan[9]	29,917	30,502	30,089	30,070	30,481	30,586	29,518	30,750	30,839	30,839	30,955	**30,700**
Ecuador	25,801	24,965	25,377	26,577	24,254	27,175	25,699	27,004	26,743	27,262	27,412	**26,798**
British India[10]	25,002	27,205	29,040	27,157	18,247	27,308	27,136	27,357	26,599	27,000[1]	27,600[1]	**27,300**
Sarawak[11]	17,530	16,580	17,270	18,337	16,597	18,001	17,472	18,072	17,340	17,309	13,913	**16,191**
Egypt[12]	13,530	13,593	13,511	13,365	12,005	13,516	12,660	12,642	12,151	11,924	20,583	**22,521**
Albania[15]	.....	.....	.....	6,200	5,650	6,200	6,060	6,200	10,790	6,873	746	**7,150**
France	5,929	5,971	5,933	5,820	5,579	6,104	5,999	6,798	6,048	6,102	6,000[1]	**5,900**
Hungary	.....	250	1,550	1,778	1,612	1,808	1,782	2,418	3,366	3,349	4,000[1]	**5,300**
Czechoslovakia	1,587	1,786	1,714	1,617	1,526	1,776	1,566	1,601	1,484	1,521	1,609	**1,600**
Bolivia	1,350	1,478	1,611	1,295	897	1,140[1]	1,110[1]	1,130[1]	1,100[1]	1,200[1]	1,160[1]	**1,000**
Italy	1,147	1,064	1,055	1,124	990	1,194	1,175	1,188	1,074	1,164	1,125	**1,100**
Other Countries[16]	900	800	900	850	770	850	830	850	830	850	850	**830**
WORLD TOTAL	24,581,175	23,326,674	23,687,398	23,288,244	21,345,081	23,092,314	21,448,020	22,293,858	21,513,056	22,569,285	23,659,398	**22,165,268**

[9] Japanese Sakhalin, Taiwan (Formosa) and Hokkaido included with Japan.
[10] Excluding Burma.
[11] Sarawak Oilfields Ltd. figures.
[12] Anglo-Egyptian Oilfields Ltd. figures.
[13] Prussia, Thuringia and Baden.
[14] Formerly known as Austria.
[15] Italian imports of Albanian crude oil.
[16] Nominal figure representing proportion to world total represented by: Morocco, Cuba, New Zealand, Barbados, Greece, Algeria, Yugoslavia, Australia, Great Britain, and China.
* Official Figures—Petroleos Mexicanos.

Official Crude Oil Production Figures for 1932 to 1937 (Revised)

	Daily Av. Jan.-Aug. 1938	Daily Av. Jan.-Aug. 1937	Total Jan.-Aug. 1938	Total Jan.-Aug. 1937	Total 1937	Total 1936	Total 1935	Total 1934	Total 1933	Total 1932
United States	**447,450**	474,029	**122,154,007**	129,410,047‡	172,822,797	148,707,864	134,912,143	122,913,903	122,601,191	106,289,292
Soviet Union	**80,290**	75,755	**21,919,000**	20,681,029‡	27,867,025	27,384,900	25,241,100	24,092,700	21,330,100	21,389,300
Venezuela	**74,704**	73,410	**20,394,136**	20,041,034	27,733,926	22,945,299	21,990,373	20,112,115	17,293,193	17,085,334
Iran	**28,940**	28,226	**7,900,754**	7,705,809	10,340,648	8,337,487	7,614,988	7,665,508	7,207,180	6,555,387
Netherland India	**20,082**	19,691	**5,482,403**	5,372,893	7,263,481	6,437,818	6,081,599	6,054,742	5,534,832	5,099,183
Roumania	**18,304**	19,627	**4,996,952**	5,358,233‡	7,146,575	8,704,000	8,394,000	8,473,355	7,387,000	7,350,321
Mexico	**12,162**	18,230	**3,320,384**	4,976,569‡	6,896,657	6,090,842	5,973,955	5,666,857	5,049,109	4,870,175
Iraq	**11,598**	11,302	**3,166,155**	3,085,373‡	4,126,185	4,079,066	3,724,231	1,048,108	147,943	118,887
Colombia	**8,118**	7,588	**2,216,177**	2,071,525‡	2,844,251	2,614,092	2,452,635	2,416,432	1,833,606	2,287,835
Trinidad	**6,688**	5,906	**1,825,764**	1,612,551	2,181,676	1,862,796	1,642,446	1,533,122	1,345,532	1,425,009
Argentina	**6,368**	6,336	**1,738,400**	1,729,733	2,330,063	2,202,304	2,036,903	1,997,706	1,950,499	1,871,882
Peru	**5,764**	6,307	**1,573,519**	1,721,712	2,313,691	2,331,454	2,260,903	2,161,990	1,756,867	1,311,856
Bahrein	**3,270**	1,822	**865,480**	497,476	1,058,557	635,555	173,072	39,008	4,293	123
Burma	**2,874**	2,929	**784,793**	799,678	1,083,391	1,047,593	991,455	1,004,951	982,233	976,589
Brunei	**1,883**	1,599	**514,186**	436,531	576,545	470,991	471,842	386,478	290,808	171,432
Canada	**2,522**	875	**688,693**	238,759	378,430	190,495	182,820	178,233	144,686	131,937
Great Germany: Old Reich	**1,524**	1,218	**415,954**	332,578	453,451	444,600	427,400	317,500	238,600	229,700
Ostmark	**184**	92	**50,266**	25,012	33,010	7,473	6,616	4,172	860	120
Poland	**1,377**	1,366	**376,025**	373,000	501,301	510,630	514,760	529,200	550,670	556,680
Japan	**1,006**	969	**274,738**	264,385	354,040	341,976	326,580	266,520	212,667	239,567
Ecuador	**875**	843	**238,924**	230,195	306,326	275,293	245,434	231,947	229,578	226,423
British India	**863**	764	**235,704**	208,414	298,450	273,137	281,072	265,341	224,879	240,767
Sarawak	**561**	590	**153,232**	160,879	217,085	221,126	253,799	277,513	315,259	332,819
Egypt	**481**	456	**131,367**	124,367	166,298	177,491	176,436	214,671	232,437	265,055
Albania	**204**	156	**55,869**	42,475	88,310	32,760	6,152	2,500	1,707	1,375
France	**199**	193	**54,350**	52,638	71,008	74,788	74,172	98,025	110,120	105,758
Hungary	**93**	Nil	**25,413**	Nil	13,910	13	Nil	Nil	Nil	Nil
Czechoslovakia	**52**	47	**14,300**	12,947	17,936	18,665	19,946	25,971	17,776	18,493
Bolivia	**37**	40	**10,032**	11,049	15,487	13,197	20,540	19,858	14,085	5,284
Italy	**37**	40	**10,134**	10,995‡	14,261	16,106	15,977	20,180	26,526	27,046
Other Countries	**28**	28	**7,510**	7,600	10,000	5,300	4,600	9,100	7,700	10,500
WORLD TOTAL	**738,538**	760,434	**201,574,621**	207,595,486	279,524,771	240,545,111	226,417,950	208,026,706	197,031,936	179,194,129

‡Preliminary total

WORLD PETROLEUM ABSTRACTS

Summaries of the Most Important Articles as Published in the Oil Press of the World Dealing With Technical and Economic Aspects of the Petroleum Industry. Edited by Dr. O. W. Willcox

GEOLOGY

Heaving Shale Trends on Texas Gulf Coast—J. M. Frost III, in OIL WEEKLY, vol. 90 (1938), No. 7, pp. 98, 100.

One of the most notable features of the oil geology of the Gulf Coast is the presence of heaving shales that have presented some difficult problems in drilling practice. It is somewhat singular that, while much study has been devoted to other features of the geology of this region, little or no attempt has been made to correlate the distribution of these troublesome horizons. This the author has done in a study of many wells that have reported the presence of heaving shales. It has been found that there are seven formational groups into which all such wells can be assembled: miocene, oligocene, Vicksburg, Frio, Jackson, Yeuga and Claiborne.

Five groups of wells form trends on the Gulf Coast and possibly two minor groups in the Claiborne and Frio. These trends have been marked on a map; they are all approximately the same width, are all parallel to the present shore line of the Gulf of Mexico, and extend completely across the Gulf Coast region.

It is possible from a map such as presented in this article to make prophecies with respect to the possibility of encountering heaving shale in any area in the Gulf Coast in which there is an interest. This map is not only helpful in considering whether heaving shale is likely to occur, but, also, what formation is likely to heave in an area.

Petroleum and Natural Gas in Non-Marine Sediments of Powder Wash Field in Northwest Colorado—W. T. Nightingale, in BULLETIN AMERICAN ASSOCIATION PETROLEUM GEOLOGISTS, vol. 22 (1938), No. 8, pp. 1020-1047.

The Powder Wash field is unique in several particulars. In the first place the oil and gas are found in the non-marine Hiawatha member of the lower Wasatch. This formation is evidently composed of material deposited along rivers and in lakes and swamps, possibly old flood plains protected from the sea. Another unusual feature is that the hydrocarbons contained in these formations were formed from indigenous organic remains; the author disproves any hypothesis that the Powder Wash oil and gas could have accumulated here as a result of either vertical or long distance lateral migration from other sources.

Local concentration of oil and gas in this field is controlled by domed folding modified by the shape and continuity of lenticular sands within the confines of the fold. Drilling hazards in this field are accentuated by the irregular and uncertain conditions of hydrocarbon generation and by the extreme lenticularity of the reservoir sands.

Role of Petroleum Geologist in Development of Law of Oil and Gas—George A. Wilson, in BULLETIN AMERICAN ASSOCIATION PETROLEUM GEOLOGISTS, vol. 22 (1938), No. 8, 1938.

This paper reviews the occasions in which a definite part is played by petroleum geologists in the development and administration of the law applicable to the various phases of the oil and gas industry. The writer is of the opinion that a better understanding by lawyers and courts of the correct geological factors present in many cases would have enabled the courts to develop a more satisfactory body of jurisprudence. Moreover, that same need for competent geological advice continues at the present time to be an important factor in enabling lawyers to determine the rights of their clients in many situations. Every lawyer who engages in any considerable amount of oil and gas practice should attempt to acquire a working knowledge of the fundamental principles of petroleum geology—not for the purpose of acting as his own geologist, but for the purpose of being in a position to realize when he does stand in need of expert advice.

DRILLING

Continuous Determination of Oil and Gas Content of Drilling Mud—Brad Mills, in OIL WEEKLY, vol. 90 (1938), No. 8, pp. 18-20.

A continuous drilling mud analysis for determining the presence of gas, oil and salt water in formations drilled has been developed by Barnsdall Oil Company, and is being used as an adjunct to regulation coring and logging data. The practice has been applied successfully in several producing districts, and is now being used at the company's Bayou Blue, Louisiana, wildcat test.

Each mud sample is tested for gas, oil, salt water and viscosity, and by plotting a log showing depth of hole, viscosity change of mud, and percentage of gas, it is not difficult to pick up significant formations. The laboratory maintained at the well is equipped for immediate determination of mud characteristics.

Pint mud samples are used as the basis for determinations. The samples are taken or accumulated at such intervals as will bring the cuttings from the previous samples to the top of the hole, as determined from the speed of the pump and annular space. This is equivalent to one round trip of the mud in the hole, and varies with the speed of the pump, depth of the hole and other factors. The time period between samples usually runs from 10 to 30 minutes. When the time exceeds 30 minutes, samples are taken at half round-trip intervals of the mud. The sampler is regulated so that about one pint of mud is accumulated during each period. A description of the sampler will be given later.

When the viscosity of the ingoing mud is controlled carefully, it is not difficult to determine the nature of the formations through mud analysis. Shales usually thicken the mud and add to its volume, dry sands ordinarily do not sharply affect viscosity, and water sands generally lower the viscosity. Oil and gas affect the mud in their own way, but they always force careful conditioning. Oil and gas sands obviously are the most desired markers.

In drilling along the Gulf Coast, experience has shown that mud ordinarily contains about one quarter of one percent gas (probably air), and that upon touching a gas sand the gas rises to three or four percent. The gas content falls back rapidly after the gas sand is passed. The mud extraction apparatus detects slight gas sands that otherwise might not be logged and gives identifying markers that may prove helpful in subsequent field development.

It is not difficult to pick up oil sands by mud analysis. As little as one gallon of 36 gravity oil added to 21,000 gal. of mud can be easily detected. Best results are obtained when the mud is kept free from tool joint grease, engine oil, and other oils entering from the surface. Use of a non-staining tool joint grease has been found effective.

Each sample is plotted on a mud log, which shows changes in mud characteristics, thus giving a continuous picture of the mud analysis data. While such records are not intended as a positive and finished logging medium, they have been useful in establishing the presence of various formations that otherwise might have been overlooked during ordinary drilling operations.

Small Hole Drilling—Brad Mills and Frank B. Taylor, in OIL WEEKLY, vol. 90 (1938), No. 9, pp. 22-28, No. 10, pp. 26-31.

Drilling an oil well is an expensive operation, and the wider the hole the greater the cost per foot.

For this reason there has lately developed an increasing interest in wells of small diameter, and manufacturers of drilling equipment have taken advantage of this interest for putting on the market relatively inexpensive rigs for drilling holes of six inches diameter or less, at a cost less than half the cost of what is considered a regular well.

Small hole drilling has now made its way in two principal directions. One is for exploratory purposes and wildcatting. Drilling in proven territory is expensive enough, but drilling in unknown country is more so; the cost of drilling the discovery wells in most American oilfields has been 50 to 200 percent greater than the average subsequent well. This high cost of wildcatting has retarded much necessary exploratory work, and operators are jumping at the chance to lower the cost of testing unknown ground. It is now possible to buy a complete rotary drilling outfit for $25,000 to $75,000 which can be easily moved from place to place; such outfits will drill a small hole to depths of as much as 6,000 feet at a cost of $2.00 a foot, as a fair average, depending on the hardness of the formations. The drilling of such a hole may not require more than a week, and after that the outfit can be quickly moved to a new location.

The purpose of the small exploratory hole is primarily to obtain accurate geological information. If an oil horizon is found, the hole can be equipped for production, or the information obtained may

be used to start drilling the conventional larger wells. Such exploration is being used to advantage along the entire Gulf Coast where 5,000 ft. wells 6⅛ in. at bottom have been put down at a cost as low as $1.50 per foot. It is also being experimented with even in the deep fields of California.

In Oklahoma, Kansas and West Texas the small hole has claimed a place for development as well as for exploratory purposes, especially in fields of low potential production. In parts of western Kansas, for instance, total possible recovery is around 5,000 bbl. an acre, the drilling cost of an orthodox large well is nearly $40,000, royalty $7,500, lifting cost $12,500—total $60,000, which is 100 percent of the value of the recoverable oil at present prices. From the operator's standpoint the proposition has no attractions. But by using light rotary equipment for drilling a small hole drilling costs are reduced more than $18,000; one operator reduced his cost from more than $4.00 to about $2.25 per foot. In Oklahoma the lowest cost for small hole development in shallow fields was $0.97 a foot; where 4½ in. casing was run the cost was only $1.50.

From this it is apparent that the small hole offers a distinct possibility of profitably exploiting fields that would otherwise be considered marginal, if not out of the question altogether. With this in mind, and also considering its unrivaled value in obtaining geological information, the advent of light weight drilling equipment is well hailed as a distinct advance in petroleum technology.

Early Development of Drilling Practices in Kanawha County, W. Va.—J. E. Billingsley in BULLETIN AMERICAN ASSOCIATION PETROLEUM GEOLOGISTS, vol. 22 (1938), No. 8, pp. 1088-1096.

It is commonly assumed by the general public, and even by numerous oil men, that the oil business began when Drake put down his famous well at Titusville, Pa. The author reviews historical facts which show that Drake was not the real pioneer of this great industry.

The art of well drilling had been perfected long years before the drilling of the Drake well. Definite oil markets and definite oil-price quotations were already in existence and on file. Natural gas was actively in industrial use. All this does not detract in the slightest from the accomplishment of Colonel Drake, who sold petroleum to an eagerly awaiting public at the opportune moment, thereby practically revolutionizing first the lighting problem and later the transportation problem.

The Turbo Drill—W. A. Sawdon, in PETROLEUM ENGINEER, Vol. 9 (1938), No. 9, pp. 35-36.

The new type of drill, in which power for bit rotation is developed in the bottom of the well-hole by the force of the streaming mud fluid is described on the basis of experience in California. Using this drill, one well has been drilled and completed below 4,000 ft. in less than a month, 18 in. hole being carried to a depth of 3,150 ft. and 12¼ in. hole to 3,900 ft. Another well in the San Joaquin valley is drilling below 4,000 ft. with a nine inch turbo drill.

The nine inch turbo drill used in this latter well has a length of 27 ft. The turbine is of the Jonval axial flow type and consists of 20 stages; each stage is rated at three horsepower with a nine pound pressure drop. It is designed for a speed of 600 r.p.m. but a smaller size (a five-inch turbine driving an eight-inch bit) has a speed of 1,200 r.p.m.; when an 18-inch bit is running at 600 r.p.m. the peripheral speed is 2,830 ft. per minute, which is about the fastest desirable with the types of bits now available.

With the turbo drill the long string of drill pipe serves merely to carry the bit, to provide weight control and to transmit the fluid from the surface of the ground to the turbine to which the bit is attached. Mud fluid is supplied to the turbine at the rate of 700 to 800 gal. per min. under a pressure of 515 to 650 lb. per sq. in. at a velocity not exceeding 20 ft. per second.

Aside from the turbo drill, nothing is changed in the conventional rotary drilling equipment. The main advantages appear to be that the life of the drill pipe is prolonged and the hazard of twist-offs is eliminated. Further, the higher rotating speed, which means faster drilling, is an obvious advantage.

The turbo drill is not a new idea. It was patented as long ago as 1883 by George Westinghouse, who knew nothing about drilling for oil. The Capelushnikov turbine drill has been used in Russia for ten years and was described in WORLD PETROLEUM. The actual results obtained with the Scharpenberg turbo drill in California provide definite data on the availability of this equipment for high-speed rotation.

Application of Core Analysis in Well Completion—John H. Campbell and James A. Lewis, in OIL WEEKLY, vol. 90 (1938), No. 7, pp. 45-46.

By a series of stages the examination of cores has reached a state of perfection whereby a core analyst can answer the operator's questions when coring in new areas, for: (a) proper spacing, (b) shot points, (c) packer setting, (d) rate of water input, (e) optimum pressure, (f) feet of floodable sand, (g) rate of oil recovery, and (h) ultimate recovery. It is apparent from these applications to every day field problems, that core analysis interpretations, made possible by direct laboratory-field correlations, played an important part in field operations.

To be of most use in the completion of flush wells it is necessary that the core be examined as soon as removed from the well before it has had opportunity to become altered or to lose any of its contents. To meet this situation a mobile core laboratory has been mounted on a truck which is brought on the spot and the core examined without delay.

Cores analyzed on location enable the analyst to extend his calculations to estimate reservoir volumes much further than if the cores were perfectly sealed and later shipped to a permanent laboratory. Uncertainties of sampling and preservation enter in unknown amount when samples are shipped and are difficult of correct computation.

OPERATION

Significance of Bottom-Hole Pressure—C. V. Millikan, in OIL WORLD, vol. 31 (1938), No. 16, pp. 3-8.

Bottom-hole pressure measurements first came into practical use in 1930, at first chiefly as regards the operation of oil fields as wholes and problems of a technical nature. Less has been done with the object of solving operating problems in individual oil wells, and it is in this direction that application of bottom-hole pressure measurements has the largest field for expansion.

The information obtained from such measurements may prove exceedingly valuable to the operator. It will indicate the probable time when the well will have to be put on the pump, and make it unnecessary to purchase pumping equipment years in advance. When it is not practicable to make an open flow test, bottom-hole pressures will allow better estimates than a low-rate-production test at surface pressures. These measurements indicate the quality of the reservoir, changes in the sand close to the bore hole, whether screens or liners are effectively serving, and will explain the cause of future changes in well performance.

A well which produces from several feet of good oil sand extending over a considerable area would be called a good well. A well producing from a thin sand when opened will have a sharp decline in the bottom-hole pressure and the rate of production will decline. A well may have sufficient thickness of good oil sand but its extent may be too small for a large ultimate production; the bottom-hole pressure may be good at first but weaken on a longer test; such information may be invaluable.

A reservoir rock may lose permeability by deposition of shale, paraffin or sediment. Such conditions can be determined by comparing the original productivity with that of the later date; if the result is too great to be accounted for by changes in viscosity of the oil, the gas-oil ratio, or water, the necessity of shooting, acid treatment or paraffin removal is indicated, otherwise cleaning need not be expected to increase production. If the reservoir pressure is high but the bottom-hole pressure low there is little chance of increasing production by changing the method of operation; the expense of such problematic changes may be avoided by bottom-hole pressure measurements.

Accumulation of water in the bottom of the hole is frequently the explanation for rapid decline in production. When a detrimental accumulation of water is suspected, its presence can readily be detected by a bottom-hole pressure measurement.

The hole through the producing formation may be filled with cavings from above, which may or may not affect the rate of production. A bottom-hole pressure measurement will show whether the well should be cleaned out, or whether such an operation will be useless.

In fields producing from unconsolidated sands it is dangerous to produce at too high a rate, which will wash sand into the hole. A few carefully conducted bottom-hole pressure measurements will show within reasonable limits what is the safe rate of production.

Bottom-hole pressure tests are as useful in wells producing by artificial lift as in those flowing naturally; they indicate the quality of the well and the reservoir, what lifting equipment to install, and whether the installed equipment is functioning properly.

Much swabbing time, with accompanying cost, may be eliminated by determining the rate of fluid build-up with a bottom-hole pressure gauge. Pressure records will be a valuable aid in estimating how much oil can be pumped from a well that has stopped flowing. When a pumping well is not producing as much as expected, a pumping test with a pressure gauge in the anchor will show whether the deficiency is in the nature of the well itself, or in the equipment.

However, bottom-hole pressure measurements must still be interpreted in the light of all other accessible information—drilling data, cores, electrical logging, etc., the production history of the well, and history of bottom-hole pressures in the vicinity.

Effect of Sunday Shut-Downs on Stripper Wells—Mitchell Tucker, in OIL & GAS JOURNAL, vol. 37 (1938), No. 11, p. 59.

With the object of restricting production, the Railroad Commission prohibited operation of oil wells on Sundays. It was expected that one result of this order would be that less oil would be obtained from the stripper fields that have been sub-marginal for years. But, it now appears that in the great majority of cases the stripper wells have not lost production; on the contrary, more production has been pumped in six days than had heretofore been produced in seven days, to say nothing of the operating savings on fuel and equipment.

This increased production during shorter operating periods is probably only remotely related in principle to the theory that has been advanced in justification of intermittent pumping. This principle is that fluid is liberated from the reservoir formation only when the well pressure is less than the formation pressure. During the shut down period the differential pressure between formation and well varies from maximum to very low. In the present case those wells that respond better to the full day shut down are those which have sufficient bottom-hole pressure and sand thickness to build up an increased fluid level during the interruption of production; so that additional oil will be in the hole to increase volumetric efficiency for the following three or four days. Where this condition is absent the effect of the 24 hour shut down is hardly distinguishable.

REFINING

Bauxite as an Adsorbent for Pennsylvania Oils—Ogden Fitzsimons, R. G. Capell, and G. C. Jones, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Activated bauxite and fuller's earth are compared, when used to produce Pennsylvania neutrals and bright stocks by percolation. Bauxite will stand higher burning temperatures than fuller's earth but prolonged overburning is harmful, as the time element, heretofore neglected, is a variable. Bauxite is very sensitive to such variables as percolation rate and mesh, and hence requires unusual care in laboratory evaluations.

No reliable means of evaluating a bauxite as an adsorbent from chemical analysis figures has been found. An apparatus and procedure are described for evaluating adsorbents by percolation wherein temperatures are maintained by circulating organic vapors through double-walled filters.

The Sarmiza Process for Making Anti-Knock Fuels and Aromatic Hydrocarbons—Marcel Nitzesco, in REVUE PETROLIFERE, No. 797 (1938), pp. 1001-1004.

The Sarmiza process is based on the concept that the thermal decompositions and polymerizations which occur when hydrocarbon vapors are heated require different temperatures, which means that there is no one best temperature for a cracking operation. With this idea in mind the Sarmiza process has been developed as a four-stage operation, each stage requiring a separate furnace.

In the first stage the hydrocarbon to be cracked, which may be kerosene, gas oil, or any other heavy petroleum distillate boiling between 150 deg. and 350 deg. C., is completely vaporized in a suitable still; in the next stage the temperature of the vapor is made to approach 500 deg. —600 deg. C. As this temperature is approached the heavy hydrocarbon molecules tend to crack in their middle, with formation of a saturated paraffin and an olefine; this is a general reaction that occurs with all paraffins except the lowest (methane, ethane). In the third. stage, which is carried out in a furnace heated to 600 deg. — 700 deg. C. the olefines produced in the second stage are polymerized and give rise to cycloolefines and aromatic hydrocarbons. In the fourth stage, which is conducted at above 700 deg., the cycloolefines are mostly dehydrogenized and appear as aromatics. Since each of these processes occur in a separate apparatus, it is easy to regulate the temperature conditions appropriate to each, and to establish a rigorous analytical control. At the end, the products are condensed and fractionated.

The process has been operated for two years in a pilot plant at Bucarest, operating on a kerosene having the following composition:

Boiling range	155-279 deg. C.
Paraffins	55.15 percent
Naphthenes	28.36 percent
Olefines	2.50 percent
Aromatics	13.99 percent

This raw material, after going through the four stages, is recovered as a crude polymer having the following composition:

	Percent
Gasoline	64.40
Heavy oils	8.59
Asphalt	9.71
Naphthalene	1.00
Ethers and alcohols	2.00
Gases	10.00
Loss	4.30

The gasoline thus produced boils 98 percent between 58 deg. and 167 deg. C. It contains 85.33 percent of aromatics, 2.00 percent of olefines and 12.67 percent of paraffins and napththenes. The gasoline has an octane number of 92 (C.F.R. motor), a copper number of 1.6 mg., and Reid vapor tension of 0.23 atm. In spite of the high content of aromatics the freezing point is below minus 40 deg. C. No carbon is formed in the apparatus. The process is said to be well adapted to treat the refractory Kogasin produced in the Fischer-Tropsch synthesis. A plant capable of treating 300 tons of raw material in 24 hours is being established in the United States.

Cathodic Protection; its Application to Refineries—Denis S. Sneiger, in REFINER, vol. 17 (1938), No. 7, pp. 345-349.

Cathodic protection of metals against soil corrosion or electrolysis, first used in the protection of natural gas transmission lines, within the past few years has been found applicable to a number of other phases of the petroleum industry. It has been found worthwhile in the protection of pump shafts, some refineries experiencing corrosion trouble at their water wells have applied the system with marked success. Refinery and other tank farms use it for protection of the large tank bottoms, and its use has extended to all types of pipelines for carrying oil, natural gas, refinery gas, water and so forth.

Chloro-Organic Compounds in Relation to Cracking Coil Corrosion—R. H. Gardner, John W. Teter, and L. I. Hansen, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Gas oil heater coils evinced corrosion when gas oil from a high-salt Mid-Continent crude was cracked. Traces of chlorine compounds were found in the commercial gas oil heater feed. The immediate problem was to confirm the formation of chloro-hydrocarbons in the crude heat exchange and flashing steps, since such compounds would subsequently decompose at cracking temperatures to give HCl.

Since $MgCl_2$ was believed to be the main source of active chlorine a Mid-Continent crude and several fractions were digested with $MgCl_2$ and water under conditions comparable to crude heat exchange and flashing operations. Digested samples, after careful washing and drying, contained chlorine in the order of 0.0007 to 0.002 percent. Therefore, chlorination of certain oil molecules can occur by reaction of $MgCl_2$.

The question has been raised concerning the effects on refinery operations should CCl_4 be used in cleaning out oil wells. Crude oil was heated with CCl_4 and moisture under conditions of crude heat exchange (350 deg. F.). HCl was evolved copiously. Organic chlorine was found in the household heating oil, gas oil, and residuum fractions in the order of about 0.12 percent. Therefore, chloro-compounds are produced.

In commercial operation whatever CCl_4 did not decompose in crude heat exchange before the primary flash would be found in the straight-run gasoline. Regular gasoline blends with CCl_4 showed no significant changes in oxidation susceptibility and antioxidant efficiencies. However, octane and TEL susceptibilities were seriously lowered.

Deparaffining by Means of Heavy Solvents and Centrifugals—G. Melik-Noubaroff, in BULLETIN ASSOCIATION FRANCAISE TECHNICIENS DU PETROLE, No. 44 (1938), pp. 39-54.

The Port-Jerome refinery in France was the first to use heavy solvents and centrifugals (Laval) for deparaffining lubricating oils. The solvent chiefly used is trichloretlylene. A deparaffining unit comprises six chillers, eight centrifugals and a solvent recovery unit. According to results desired, the percent of solvent varies from 40 to 60 and the temperature from —15 deg. to —30 deg. C. The velocity of cooling averages five degrees an hour.

At this refinery the technique of separating paraffins by means of Paraflow has been reduced to a good working basis. Paraflow is a chlorinated condensation production of a long-chain aliphatic hydrocarbon with an aromatic hycrocarbon produced by the Standard Development Co. Added to a chilled magma of solvent, oil and paraffin, which latter may occur in an amorphous or gelatinized condition, it breaks up the gel and promotes rapid separation of the solid wax. Very small quantities (0.1 to 0.2 percent on oil) are sufficient. The yield of deparaffined oil is increased 20 percent, and the oil remains clear after long periods of storage. The separation by the centrifugals is made so easy that the capacity of the original plant was increased by as much as 20 percent.

Selectivity of Acetone at Different Temperatures in the Solvent Refining of Oils—R. Verona and C. Fostiropol, in MEMOIRS ACADEMIA ROMANA (Bucarest), vol. 14, (1938), No. 4, pp. 1-18 (in French).

Two lubricating oils and a residue were each extracted in 10 stages with acetone at three different temperatures: —20 deg., 0 deg., and 20 deg. C. In each case the residue left after the 10th extraction was extracted at 50 deg. C. Each of the fractions was extensively studied by various analytical methods.

In all cases the density and the refractive index diminished with each series of fractions, while the viscosity index, molecular weight, and aniline point increased. In one of the oils the viscosity, instead of increasing from one fraction to another, showed an increase.

As regards chemical constitution, the percentage of aromatic nuclei constantly diminished from one fraction to another; content of napthenic nuclei and paraffin chains increased, but the latter increased in a much smaller proportion than the former. The lower the temperature of extraction, the more pronounced the preferential solubility of acetone as regards certain constituents. For this reason the fractions extracted at —20 deg. C. are characterized by higher densities and refractive indexes, with lower aniline points and viscosity indexes.

The last fractions representing the refined product have much the same viscosity index, regardless of the temperature of extraction. However, the yield is decidedly in favor of the lowest extraction temperature. The difference in yield of raffinate between extraction at —20 deg. and at 0 deg. C. was nearly 20 percent in one case and nearly 60 percent in another.

CHEMISTRY

Determination of Gasoline Unsaturation by Vapor Phase Hydrogenation—R. D. Pinkerton, A. K. Roebuck, and S. J. Wayo, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1936.

A routine method applicable to normally liquid aliphatic hydrocarbon mixtures within the gasoline boiling range but containing no hydrocarbons lower than C_6 is described.

Analysis of pure hydrocarbons and hydrocarbon mixtures indicates an accuracy of three percent. Hydrogenation is carried on in the vapor phase. The sample, in a current of hydrogen, is passed drop-wise into the bottom of a combination vaporization and catalyst chamber maintained at 400 deg. F. The hydrogen-hydrocarbon mixture passes upward through the catalyst, which is reduced nickel on asbestos. The hydrogen and hydrocarbon are separated by condensation of the latter, each is collected in a suitable receiver, and the contraction in hydrogen volume is determined. This cycle is repeated until hydrogeneration is complete, as indicated by a constant hydrogen volume. The molecular weight of the sample as determined and the mole percent of hydrogenation is then calculated. Hydrogenation is complete in about 4 to 6 cycles, and the entire analysis requires 3 to 3½ hours. Only 3 to 4 cc. of sample are required. A diagram and description of the apparatus are included.

Chemical Reactions of Cracked Residues—Hans Tropsch, Charles L. Thomas, J. C. Morrell, and Gustav Egloff, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

The oil remaining after the removal of asphaltines from cracked residue will react with nitric, sulphuric, and phosphoric acids, chlorine, sulphuryl chloride, anhydrous aluminum chloride, stannic chloride, titanium tetrachloride, ethyl sulphate, and potassium permanganate.

Sulphuric acid treatment raises the viscosity index of the oil. The viscosity of the treated oil can be raised by chlorinating the oil and treating the chlorinated product with anhydrous aluminum chloride and benzene. The optimum amount of chlorine is about 10 percent of the oil. The oils so formed have pour points of 80 deg. to 90 deg. F. due primarily to wax in the original residue.

Thermal Decomposition of Petroleum Hydrocarbons into Free Radicals—B. L. Evering, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Various close-cut naphthas and petroleum butane were heated to temperature near 1,000 deg. C. at low pressures. The presence of free radicals in the decomposing hydrocarbons was demonstrated by contacting the vapors with a fresh lead surface (constantly renewed by condensation from vaporized lead), and analyzing the products for lead alkyls. The effect diminishes very rapidly as the pressure is increased above 6 mm. of mercury. The data obtained do not permit any confident statements as to the mechanism involved.

Production of High-Octane Isoparaffinic Fuels by Addition of Olefins to Isoparaffins—S. F. Birch, A. E. Dunstan, F. A. Fidler, F. B. Pim and T. Tait, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

In the presence of concentrated sulphuric acid the lower olefins, with the exception of ethylene, react with isobutane to give a product from which a fully saturated fraction b.p. 27 deg. to 185 deg. C. may be isolated by distillation. This material apparently consists entirely of isoparaffins ranging from isopentane to isodecanes and higher. Its high octane rating, roughly 90+, coupled with its low sulphur content, renders it an excellent component for 100-octane aviation gasoline. The reaction is not limited to isobutane and has been extended to isopentane and 2-methylpentane, but the lower octane ratings of the gasoline fractions obtained from these isoparaffins render them less suitable as components for 100-octane fuels. The effect of varying the reaction conditions upon the yield and nature of the product is outlined. As satisfactory starting materials for commercial operation the unsaturated C_4 cut obtained from normal cracking operations may be employed together with an isobutane concentrate taken from natural gasoline stabilization. The heat evolved in the reaction and acid consumption are briefly discussed.

Tetraethyl Lead Susceptibility of Gasolines Treated with Doctor Solution versus Caustic Washing—L. M. Henderson, W. B. Ross, and C. M. Ridgway, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Mercaptans present in gasoline stocks may be removed to a very large extent by efficient scrubbing with caustic soda solutions. Data are presented to show that gasolines thus treated require less tetraethyl lead for the production of a given octane number or antiknock value than the same gasoline stock treated in the conventional way with sodium plumbite (Doctor solution) and elemental sulphur. The difference in tetraethyl lead requirement is greater when an excess quantity of sulphur is used in the conventional plumbite treatment. Efficient scrubbing of mercaptan-containing gasoline with NaOH solutions followed by the sodium plumbite treatment gives better tetraethyl lead susceptibility than the same gasoline stock treated only with plumbite solution and sulphur. The spent caustic solutions may be regenerated by boiling and used repeatedly.

Catalytic Isomerization of Normal Octane—Y. K. Yur'ye and P. V. Pavlov. Translated by Vladimir Haensel for Petroleum Division of the Am. Chem. Soc., O. & G. J., 37 (1938), 55-57.

Normal octane mixed with hydrogen was passed over catalysts at a temperature of 300-310 deg. C. The catalysts used were platinum (20 percent) on activated carbon, and nickel (23 percent) on aluminium oxide. Some experiments were also made with nickel (21 percent) on zinc oxide. The catalyzing operations were conducted in three phases.

Analysis of the products showed that under these conditions, an isomerization of normal octane into hydrocarbons of iso-structure takes place to the extent of 15 percent (average value) in the presence of a platinum catalyst on carbon, 5.5 percent in the presence of nickel on aluminum oxide, and around 8 percent from nickel on zinc oxide. Yields from aluminum oxide alone and activated carbon alone were relatively smaller.

Research on the Synthesis of Paraffins of High Molecular Weights—H. Pichler, in BRENNSTOFF-CHEMIE, 1938, pp. 226-230.

A mixed gas containing one volume of carbon monoxide and two volumes of hydrogen was passed through a heated tube at a rate of one liter per hour under a pressure of 100 atmos. at a temperature of 195 deg. C. The tube contained a ruthenium catalyzer, which proved by far the most efficient for this reaction. The synthetic product consisted of 140 to 150 gr. of solid hydrocarbons and 5 to 10 gr. of gas oil from each cubic meter of the gas mixture (referred to standard conditions of temperature and pressure). These yields were obtained with remarkable constancy during the six-months duration of the experiment.

Among the hydrocarbons recovered, 100 gr. (per liter of gas) consisted of a white, oil-free paraffin melting at 118 to 199 deg. C. By means of a selective solvent (boiling toluol), a series of hitherto unknown paraffins was isolated; some of these had molecular weights of 7,000 to 9,000, with melting points up to 132 deg. C.

Solvent Analytical Separation of Waxes from Petroleum—Joseph W. Horne and W. C. Halliman, in BUREAU OF MINES TECHNICAL PAPER NO. 583 (1938).

This report presents a basic method for the analytical separation of wax from oil using selective solvents. The method consists in dissolving a small accurately-weighed sample in a definite volume mixture of acetone and methylene chloride. In this mixture acetone precipitates the wax without impairing the solubility of the oil in the methylene chloride. The proper proportions of acetone and methylene chloride, as well as the ratio of solvent to solute must be ascertained by preliminary experiments.

The procedure consists in placing the oil and solvent in a filter surrounded by a batch of kerosene chilled to a definite temperature with solid carbon dioxide; after the wax has separated, the residual solution is drawn off through the bottom of the apparatus; the wax is washed with the cold solvent and its weight determined according to usual procedures.

Sulphuric Acid Analysis of Gaseous Olefins—Maryan P. Matuzak in INDUSTRIAL ENGINEERING CHEMISTRY, Anal. Ed., vol. 10 (1938), No. 7, pp. 354-360.

Principles and limitations governing the selection of conditions for determination of gaseous olefins by absorption in sulphuric acid are presented briefly. Data indicating the influence of the following previously uninvestigated factors upon analytical results are given: (1) reversibility of absorption; (2) solubility of gaseous paraffins in sulphuric acid; (3) increase in solubility of hydrocarbons because of acid-soluble absorption products; (4) solubility of hydrocarbons in precipitated polymer products; and (5) liberation of unabsorbable gas by overstrong absorbents, including those containing silver sulphate.

The method is based on the use of sulphuric acid in different concentrations, through which the sample to be analyzed is successively passed. The following absorbents are satisfactory.

Olefin	Preliminary Absorbent	Final Absorbent
Isobutylene	60—62% H_2SO_4	68—70% H_2SO_4
n-Butenes, propylene	80—82% H_2SO_4	88—90% H_2SO_4
Ethylene	88—90% H_2SO_4 + 0.9—1.0% Ag_2SO_4	98—100% H_2SO_4 + 0.4—0.5% Ag_2SO_4

The gaseous olefins can be determined to within 0.2 percent. An appropriate apparatus is described.

PHYSICS

Viscosity Pole Height and Direction Constant—Karl Schwaiger, in OEL UND KOHLE, vol. 14 (1938), No. 25, pp. 518-520.

The author of this paper joins the swelling chorus against the Dean and Davis concept of viscosity index now in considerable use for judging lubricating oils, especially in the United States. Its place should

be taken, he says, by the concepts of the direction constant m and the viscosity pole height W_p introduced by Ubbelohde; these concepts have proven exceptionally useful in the investigation of lubricating oils. The direction constant gives the steepness of the viscosity curve, and the pole height determines to what group an oil under examination belongs. The important point here is that m and W_p are physico-mathematically defined oil constants, whereas the viscosity-index is given by an arbitrarily determined comparison scale; pole-height and direction constant are absolute magnitudes, free from all empiricism.

The fact that lubricating oil men continue to work with the empirical viscosity-index, in spite of the existence of a thoroughly scientific basis for the examination of such oils, is ascribed to the clumsiness of the graphical methods heretofore employed for determining m and W_p. This has now been changed. The original Ubbelohde viscosity-temperature chart has been improved and simplified, and is provided with guide lines so that only a single straight-edge is needed. All that is necessary is to enter two viscosity determinations on the chart. The straight line joining these two points intersects a point on an auxilliary line lying outside the chart. With this point as a center this line is rotated until it crosses the 100-point of the viscosity scale; its prolongation will intersect two other auxilliary lines giving respectively the viscosity pole height and the constant m.

In general, W_p can be calculated from the formula

$$W_p = \frac{2587 \times W_{50} - 1587 \times W_{100}}{31 - 104\ (W_{50} - W_{100})}$$

Determinations of W_p on a series of oils by the modified graphical method agree with almost absolute precision with the figures obtained by calculation.

Ultraviolet Absorption Spectra of Simple Hydrocarbons—Emma P. Carr and Hildegard Stucklen, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Examination of the ultraviolet absorption spectra of twenty-six unsaturated hydrocarbons, including olefins, diolefins, and cyclic hydrocarbons in the region 2300 to 1600 Å, using a fluorite vacuum spectrograph, has shown that (1) the light absorbed by a given hydrocarbon molecule is determined by the number of hydrogen atoms directly bound to the carbon atoms of the double bond and is independent of the size or arrangement of the alkyl group; (2) there is a progressive shift of absorption toward longer wave lengths as the number of these hydrogen atoms is decreased; (3) the spectra of all cyclic hydrocarbons examined show vibrational fine structure.

The results in general can be used for identification of structure of a pure hydrocarbon and give new evidence as to the energy relationships of the carbon-carbon double bond.

Studies on the Viscosity-Temperature Function of Mineral Lubricating Oils—J. Groff and Leo Ubbelohde, in OEL UND KOHLE, vol. 14 (1938), No. 22, pp. 457-464.

In spite of their obvious defects, ancient systems of measurement are very tenacious of life. This applies to old units employed in expressing the viscosities of mineral oils—Engler degrees, Redwood or Saybolt seconds which continue to hang on in spite of repeated demonstrations that no proportionality exists between the measurements made on the old type viscosimeters, and in spite of the introduction of the centistoke system. It is only after the introduction of this system that it became possible to obtain clear concepts of the temperature function of viscosity, the direction-constant of viscosity graphs and viscosity pole-height, to get a better idea of the hydrodynamic action of lubricating oils, and to dispel many false ideas about lubrication.

It is gratifying to note an increasing tendency to abandon the old systems in favor of the more rational one, but Ubbelohde is much disturbed by a disposition in some quarters to carry over parts of the old empirical systems into the kinetic system. One of these hybrids is the viscosity-index, a purely conventional concept derived from the Saybolt system and grafted on the absolute centistoke, apparently without recognition that the purity of calculation in absolute figures is spoiled.

The intrusion of such bastard concepts is not due so much to the inherent complexity of the absolute system as to the power of old habit. This habit should be thrown off, because lubricating oil constants must often be employed in mechanical formulas and calculations which require absolute figures.

In this paper it is shown how graphical representation of the viscosity temperature function can be employed to characterize any oil in absolute figures by a single point that depends on only two parameters, each of these parameters being constant either along a straight line or a curve. By this means it is possible to find solutions for the following problems: the viscosity in centistokes at any temperature between —20 deg. and +250 deg. C.; the temperature at which two oils will have the same viscosity: the viscosity of mixtures of two or more oils, and the proportions of these oils in a mixture of given viscosity: rapid selection of one or more oils or oil mixtures that will meet one or more conditions.

Approximate Molecular Weights of Higher Hydrocarbon Fractions—F. A. Lucy, in INDUSTRIAL ENGINEERING CHEMISTRY, vol. 30 (1938), No. 8, p. 959.

In a study of the types of molecules present in a given lubricating oil or other complicated mixture of hydrocarbons, it is desirable to know the molecular weights of the various distillation cuts. This is usually determined accurately by careful measurements of freezing point depression. For estimation of parachors or molecular refractivities to compare with values expected for various assumed structures, an approximate value of the molecular weight is sufficient.

Mair and Willingham published the boiling points at 1 mm. for a number of lubricating oil cuts ranging from C_{27} to C_{39}. The writer recently measured the boiling points of three other hydrocarbon oils in the range C_{18} to C_{21}. Both sets of data are fitted well by a Walker-type equation,

$$T = 111.3 n_{0.4395}$$

where, for the writer's data at least, T is the uncorrected distilling temperature in deg. K. at 1 mm., and n is the number of carbon atoms per molecule. In terms of molecular weight,

$$M = (T/35)_{2.276}$$

This probably holds without serious error down to C_{15}. Lighter hydrocarbons are conveniently distilled at one atmosphere.

Graphic Representation of the Viscosity-Temperature Function—Fritz Jostes, in OEL UND KOHLE, Vol. 14 (1938), No. 27, pp. 559-564.

This paper deals with extensions of the newer concepts of the viscosities of oils, originated chiefly by Ubbelohde as set forth in his book Zur Viscosimetrie. The present paper, like others on the same line, stresses the essentially empirical nature of the viscosity-index concept put forward by Dean and Davis in 1929, and which is extensively used in the United States for characterizing lubricating oils. The main objection to the viscosity-index of Dean and Davis is that it is directly based on arbitrary Sayboldt numbers and hence is divorced from a real scientific basis grounded in absolute units. However, it is not denied that the viscosity-index is of limited practical use, but it is not capable of representing the whole range of proper ties of an oil.

The new concept is largely an extension of the Walther equation: $W = m\ (\log T - \log T_1) - W_1$. Wherein

T_1 = absolute temperature
V = kinematic viscosity in absolute units,
W_1 = loglog $(V_1 - 0.8)$,
W = loglog $(V - 0.8)$
m = a direction constant giving the slope of the viscosity straight

Making use of this notation it is possible to flatten out the strongly curved viscosity-temperature curve to such an extent that for all practical purposes the most important portion of the curve becomes a straight line, which is called the viscosity straight in the new terminology. This line is graphed by plotting the values of W against the logarithms of the absolute temperature, from which Ubbelohde has derived a series of important concepts. Among these is the viscosity pole. The main significance of this is that the distance (W_p) of the viscosity pole from the absissae $(W = O)$, or the so-called pole height is a characteristic property of the lubricating oil and is sufficient for describing the oil throughout its whole lubricating range. In contrast to the viscosity index the pole height is a physically definable magnitude which has a real theoretical basis, and is therefore to be preferred to a viscosity index based on Sayboldt-seconds at 100 deg. and 210 deg. F.

The paper gives a number of graphical solutions of viscosity problems that supplement and extend those contained in Ubbelohde's book.

Physical and Chemical Constants of two Completely Hydrogenated Lubricating Oils Made by the Fischer Tropsch Gasoline Synthesis—D. J. W. Kreulen, in CHEM. WEEKBLAD, vol. 35 (1938), No. 22, pp. 410-411.

The author determined 26 constants of these oils, as given below.

	Oil 1	Oil 2
Molecular weight	774	457
Aniline point	134.7 deg. C.	115.2 deg. C.
Specific gravity 20/4	0.8580	0.8453
Refraction D/20	1.4744	1.4677
Specific refraction	0.3278	0.3287
Specific dispersion	1.55	155
Hydrogen, percent by weight	14.20	14.30
Molecules per ring (sp. ref.)	1.8	1.2
Molecules per ring (sp. ref.)	4.0	2.3
Surface tension 20 deg. C.	30.28	29.81
Specific Parachor	2.734	2.761
Extra Tert. Carbon atoms	22	11
Naphthene rings, percent	12.8	15.7
Paraffin chains, percent	87.2	84.3
Carbon, percent	85.8	85.7
C atoms in mol.	55.3	32.6
C atoms in rings	9.2	6.8
C atoms in chains	46.1	25.8
Tertiary C atoms	23	12
Percent C atoms in side chains	50	40
Viscosity 37.8 deg. C. (centis.)	333	460
Viscosity 70	63.5	13.4
Viscosity 98.9	22.6	6.17
Viscosity index (D. & D.)	92	83
Viscosity pole-height	1.99	1.94
Conradson number	trace	trace
No crystalization at	30 deg. C.	30 deg. C
Static friction coeff.	0.186	0.182

From this examination it will be seen that Fischer-Tropsch oils have a character different from that of ordinary petroleum products, particularly as regards their strongly isoparaffinic character. The paraffinic side chains are much branched. Although the molecular weights of these two oils are different, their molecular constitutions are parallel.

Another point to be noted is that while the viscosity pole-heights are identical, the viscosity indexes determined according to Dean and Davis are different. This is held to confirm the Ubbelohde law that oils of the same origin have the same viscosity pole-height.

The specific dispersion shows that the hydrogenation has been complete. The high static friction coefficient is the natural consequence (absence of polar compounds).

Application of Physico-Chemical Principles to the Investigation of the Properties of Rocks—A. H. Nisson, with C. E. Wood, L. V. W. Clark and A. W. Nash, in JOURNAL INSTITUTION OF PETROLEUM TECHNOLOGISTS, vol. 24 (1938), No. 177, pp. 351-392.

This contribution consists of two papers that give a fairly complete survey of the principles and methods used in determining the porosity of rocks from the standpoint of the petroleum industry. In addition, the authors have attempted to develop a method for the available and total porosities that would give a higher accuracy than any other known methods. The best accuracy heretofore attainable is by the latest Bureau of Mines method (Bureau of Mines R. I. 3352, Sept. 1937) which gives results within plus or minus 0.25 percent. Hence any new technique should have at least this accuracy.

In pursuit of this objective they devised a liquid absorption method and a gas expansion method which they describe in great detail. By these methods the available porosities of rocks is measurable with a maximum error of plus or minus 0.25 percent from a mean value under the most unfavorable conditions. Actual results, obtained by both methods are nearly twice as accurate. Of the two processes the gas expansion method is quicker, since in repetition work on any particular sample no drying period is necessary, as is the case with the liquid absorption method.

Total porosity (as distinct from available porosity) is not recommended as an accurate indicator for physical and chemical treatments of rocks, although a method has been developed to determine total porosity with accuracy.

USE

Cooperative Fuel Research Motor Gasoline Survey—E. C. Lane, in BUREAU OF MINES REPORT OF INVESTIGATIONS No. 3408, June, 1938.

This is the fifth in a series of reports of the properties of motor fuels currently on the market in the United States. The report covers 84 brands and 1,722 samples of gasoline collected in the winter of 1937-38 in the principal cities. The analytical data are summarized in the accompanying table, in which the heading "range of 90 percent" signifies that the data represents 90 percent of the samples considered, exclusive of abnormally low or high figures.

Motor-Gasoline Survey, Winter 1935-1936

TEST	Regular-price gasolines Min.	Regular-price gasolines Range of 90%	Regular-price gasolines Max.	Premium-price gasolines Min.	Premium-price gasolines Range of 90%	Premium-price gasolines Max.	Third-grade gasolines Min.	Third-grade gasolines Range of 90%	Third-grade gasolines Max.
Gravity, degrees A.P.I.	54.0	58.0 — 66.5	68.6	50.1	57.5 — 70.0	75.4	55.4	56.5 — 64.0	69.5
Sulphur content, percent	0.014	0.02— 0.15	0.30	0.006	0.02— 0.08	0.179	0.016	0.02— 0.20	0.23
Reid vapor pressure, lb.	5.8	7.1 — 12.4	13.15	3.1	5.0 — 11.5	12.55	4.2	5.5 — 10.4	13.4
A.S.T.M. octane number	61	68 — 71	72	69.1	73.7 — 80.5	81	33.5	50 — 66	69.1
Initial boiling point	79	82 — 98	100	76	84 —107	128	78	84 —104	128
10 percent recovered	108	114 —144	155	110	115 —150	178	113	127 —161	179
30 percent recovered	124	132 —175	186	117	134 —176	201	128	150 —196	205
30 percent recovered	141	156 —206	218	124	147 —209	224	146	183 —224	233
50 percent recovered	178	207 —255	266	143	180 —252	261	184	230 —276	282
70 percent recovered	192	267 —308	316	181	225 —301	314	223	270 —326	337
90 percent recovered	245	335 —377	388	264	273 —359	378	292	330 —393	399
End Point	332	385 —415	464	331	343 —415	439	341	388 —430	511
Distillation loss	0.9	1 — 3.5	5.0	0.5	1 — 3	3.6	0.5	1 — 3.5	5.5

A range of 8.6 to 12.2 is shown in the vapor pressures of 90 percent of the regular-price gasolines. This shows a narrower range for this winter as compared with last winter although the two years show virtually the same range of distillation temperatures. The premium-price gasolines have a range of 7.8 to 11.8 which is only slightly greater than for the preceding year with a narrower range of distillation temperatures. The third-grade gasolines show a range of 6.2 to 11.1 in vapor pressure which is wider than that of the previous winter and is accompanied by a wider range of the distillation temperatures.

The octane-number ratings of regular-grade gasolines, as indicated by the range of 90 percent of the samples, show an increase of a fraction of an octane number over the previous winter survey, as indicated by a comparison of tables 5 and 6. The octane number of premium-price gasolines remains substantially the same as reported in the previous winter survey.

The data of this survey in some respects are different from the corresponding figures in the preceding surveys owing to the inclusion of a larger number of analyses and the inclusion of reports from a greater distance surrounding the center of the districts reported. In general, no definite tendencies in change of characteristics are evident. The five surveys in this series indicate that gasolines in the various price classifications fall into definite groups with respect to the characteristics reported in the surveys.

Cold Method for Drying Insulating Oils—H. W. R., in OEL UND FETT ZEITUNG, vol. 35 (1938), No. 7, pp. 309-310.

The German AEG (General Electric Gesellschaft) has announced a new patented method of drying insulating oils intended for use in transformers. Prior methods of dehydrating such oils have mostly involved heating the oil by electrical means to a temperature sufficiently high to vaporize the water, with or without the assistance of a vacuum. An apparently unavoidable consequence of such heating processes is a partial decomposition of certain constituents and a deterioration of the quality of the oil, which lead to a premature ageing. Hence it was desirable to find a drying method that would avoid the use of heat.

After an experimental period which is said to have occupied several years the following method was evolved.

Two iron drums are connected by two strong rubber hoses, each provided with a spray nozzle, with a third hose connected to both drums and an efficient vacuum pump. At the beginning of the operation one of the drums is filled with the oil to be dried, and the other is empty. A vacuum of 90 to 95 percent is created in the empty drum; this sucks the oil from the full drum into the empty one, where it is atomized by the spray nozzle. Meanwhile a current of perfectly dry air is introduced into the full drum in the form of very fine bubbles; the function of these air bubbles is to provide boundary surfaces from which the water in the oil may evaporate; the water thus vaporized is constantly removed by the vacuum pump. When all the oil has been transferred from the one drum to the other the operation is reversed by adjusting a four-way valve, and the process is repeated until a sample of the oil shows a resistance equivalent to 200 kv/cm or above. The time required is 1½ to two hrs. This simple outfit can be built to suit any desired scale of operations and may be used by individual power plants for freshening the oil in their transformers and electric switch boxes.

Studies on Roumanian Methane—C. Candea, in MONITEUR PETROLE ROUMAINE, vol. 39 (1938), No. 14, pp. 1139-1145.

The Roumanian oilfields annually produce enormous quantities of natural gas, which is mostly pure methane. At present this gas has no other use than as fuel, for which a very low price is obtained. Aside from serving as a source of hydrogen for a synthetic nitrogen industry, the author has examined various other possibilities. One of these relates to the use of methane for reducing metallic oxides in smelting operations. In the case of hematite (Fe_2O_3), the ore is transformed at 750 deg. C. into FeO, and reduction to metal is complete at between 800 and 900 deg. C. The best proportions are 2 to 2½ liters of gas per hour for each gram of Fe_3O_4 in the smelting apparatus, and the best temperature is 900 deg. C. Different ores, as limonite and siderite, require somewhat higher temperatures. By suitable regulation of the temperature it is possible to decompose a sufficient quantity of methane to furnish enough free carbon to produce a satisfactorily carburized cast iron. Zinc ores are completely reduced at 900 deg. C. For reducing tin oxide and copper oxide it is necessary to use an excess of methane in a recycling operation, copper is reduced at 400 to 720 deg. C., tin at 700 to 910 deg. C.

Certain metal chlorides, as calcium chloride and alkali chlorides, can be reduced by methane to produce free hydrochloric acid, the metals appearing as hybrids, for example NaH, but it is better to conduct the operation in the presence of silica and iron oxide, in which case a mixture of sodium and ferrous silicates is obtained.

Aside from these uses there remains a large field for the use of methane in the synthesis of liquid and solid hydrocarbons which are directly usable.

SUBSTITUTES

Motor Fuel Economy of Europe—Gustav Egloff before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Self-sufficiency strikes the keynote for the desires of most European nations. The production of substitute motor fuels derived from their own resources such as coal, wood, oil shale, and agricultural products is one of the goals. The economics involved is not the primary factor.

Coal is converted into liquid motor fuel by carbonization, hydrogenation, and the water gas reaction.

Alcohols from farm products and methanol from hydrogenation of carbon monoxide and wood distillation are also used.

Methane, ethane, propane, and butanes, or city gas, are used in a compressed form in steel cylinders (3,000 to 4,000 lb. pressure) in gas-driven motor vehicles. These gases are derived from coal carbonization, hydrogenation, and hydrogenation of carbon monoxide and natural gas. There are about 2,000 of this type of motor vehicle in use. Other types of gas-driven vehicles manufacture their own combustible gas en route from wood and charcoal. There are about 9,000 such wood-burning motor vehicles in Europe consuming about 450,000,000 lb. of wood yearly. These motor vehicles are heavily subsidized by governments through direct payments, elimination of taxes on the wood and vehicle, and taxes on imported gasoline.

Total consumption of power alcohol in Europe in 1937 amounted to 510,000 tons compared with 646,000 tons during 1936. The 510,000 tons of ethyl alcohol (some methanol) represented 4.3 percent of the total 11,882,600 metric tons of motor fuel consumed during 1937 in Europe. It is estimated that the 510,000 tons of alcohol used in Europe cost the consumer and state in additional expenditures on the order of about $100,000,000 in subsidies, tax losses, and higher operating costs of vehicles.

Cracking Tars and Distillates from Coal—Gustav Egloff, G. B. Zimmerman, W. E. Lemen, and J. C. Morrell, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Pilot plant tests were made to evaluate the cracking characteristics of coal by-products, including high and low temperature tars, high temperature creosote oil, lignite tar and its fractions, and coal-oil carbonization distillates. The products obtained were gasoline, along with low boiling phenols and cresols, gas, and fuel oil or coke residues. The olefin-containing gases are raw material for synthetic hydrocarbons or high-grade polymer gasoline; the coke is convertible to electrode carbon and valuable tar acids or cresylic acid fractions are obtainable. Comparison with petroleum cracking shows these raw materials to be very refractory, but they yield more gasoline than anticipated from the specific gravity. The gasolines are of satisfactory quality when finished and have higher heats of combustion per unit volume than those from petroleum. The gas production is generally greater than in petroelum cracking. It is of lower molecular weight, but can produce useful concentrations of higher olefins by fractionation.

Liquid-Phase Hydrogenation of Pittsburgh Seam Coal in Bureau of Mines Experimental Plant—L. L. Hirst and others, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Quantitative procedures for the hydrogenation assay of American coals have been developed. All of this work was done with one coal—namely, Pittsburgh seam coal from the Bureau of Mines Experimental mine at Bruceton, Pa. The assay work on this coal has been completed. Data are presented concerning the effect of varying temperature, contact time, agitation, and pressure.

The assay consists in determining the optimum conditions in liquid phase hydrogenation for the maximum yield of a middle oil consistent with the complete regeneration of the vehicle used in making a paste with the original coal. For Bruceton coal the optimum conditions are approximately 440 deg. C., 200 to 300 atmos. pressure, 1.75 hr. contact time, and circulation of about 100 cu. ft. (measured at 20 deg. C. and 760 mm. pressure) per hr. of hydrogen. Under these conditions a yield of about 73 percent middle oil (containing 20 percent boiling in the gasoline range, and 80 percent boiling below 330 deg. C.) and 12 to 15 percent of hydrocarbon gases (methane to butane), are obtained in a single pass through the converter. The 12 to 15 percent loss consists of six to eight percent unreacted carbonaceous material (fusain and opaque attritus) and six to seven percent oxygen, nitrogen, and sulphur hydrogenated to water, ammonia, and hydrogen sulphide. The middle oil contains 15 to 18 percent tar acids and three to five percent tar bases, and the remaining neutral oil contains six to eight percent olefins, 67 to 70 percent aromatics, and 22 to 27 percent saturated hydrocarbons.

Hydrogenation Tests on Canadian Coals: II—Experiments with Nine Coals Ranging in Rank from Medium Volatile Bituminous Coal to Lignite—T. E. Warren, K. W. Bowles, and R. E. Gilmore, before AMERICAN CHEMICAL SOCIETY, Milwaukee meeting, September, 1938.

Hydrogenation tests on nine coals representative of various groups in the A.S.T.M. classification between medium volatile bituminous coal and lignite are described. The method of test was based on continuous operation in a liquid phase plant having a capacity of about nine pounds of coal paste per hour. The vehicle in each case was oil produced previously by the hydrogenation of the coal being tested.

The rank of the coal was found to have a fairly consistent influence on the yields, although one of the coals was exceptional. The bituminous high-volatile A and B groups gave the highest yields of oil. The composition of the ash did not appear to have an appreciable influence and the geological age also had only a minor effect, if any, on the yields. There is an apparent relationship, fairly consistent throughout the present series, between the nitrogen content of the coal and the degree of liquefaction.

A sample of coal used for commercial hydrogenation in England was included in the series as a standard of comparison. It yielded 71.5 percent of primary oil on the ash and moisture-free basis. Two of the Canadian coals gave yields of 77.2 percent and 73.8 percent and the lowest yield of all the coals tested was 53.3 percent. On the basis of ash as charged and moisture as mined, only one Canadian coal gave a higher yield of primary oil than the English standard coal and the yields diminished progressively with descending rank to about one-half that of the English coal.

ECONOMICS

Chemical Trends in the Petroleum Industry—Per K. Frolich, in INDUSTRIAL ENGINEERING CHEMISTRY, vol. 30 (1938), No. 8, pp. 916-922.

This paper discusses and interprets those achievements which most clearly illustrate and typify the chemist's contribution to the present day petroleum industry. After outlining the more familiar aspects of the industry such as cracking, hydrogenation, and synthetic fuels, there is an interesting discussion of special products from petroleum materials as these have been studied and exploited by the Standard Development Company.

Among these are certain polymeric hydrocarbons obtained from refinery unsaturates that have molecular weights of 10,000 to 15,000; a few percent of these long, straight chain hydrocarbons will raise the viscosity index of a paraffin base oil from 100 to 125 or more, with only a small increase in actual viscosity; these products are beginning to find wide use.

Another specialty originated by the chemists is the pourpoint depressant, which is used to prevent the separation of waxy compounds when a lubricating oil is chilled, thus preserving the liquidity of the oil in cold weather. The material most commonly used for this purpose is a high-molecular weight condensation product of aromatic compounds and paraffin wax. This of course alleviates some of the difficulties that are encountered in the factory production of lubricating oils by fractional crystallization of the wax. Other chemical contributions to this field include the development of inhibitors and oiliness agents to improve high-temperature stability of lubricating oils, and to reduce sludge formation, ring-sticking and bearing corrosion in modern high-speed automotive and aviation engines. Even when used in concentrations of less than one percent, certain oiliness agents are capable of improving the load-bearing characteristics of lubricating oils.

All the above developments are now part of the equipment of the petroleum industry in its major function of providing automotive fuel and lubricants. Within the past 15 years the petroleum chemist has branched out into lines that affect many other phases of industry, and conveniences and comforts of living. Hydrocarbons are now industrially employed as a source of a large variety of alcohols, esters, ketones, glycols, and the aromatic hydrocarbons that are the bases of the dye and explosive industries. It is no longer necessary to depend only on coal tar for supplies of T. N. T. and picric acid for military purposes. Naphthenic acids and mercaptans can be recovered in amounts greater than the markets can absorb.

Beyond these are other vast possibilities that are becoming materialized. The resistance of petroleum hydrocarbons to oxidation is being overcome and the way is being opened to the production of higher-molecular-weight fatty acids that can be used in the manufacture of soaps and even for food. The production of materials that can substitute rubber is now an accomplished fact.

A new outlook for petroleum products on a large scale is offered by the possibility of manufacturing resins and plastics, of which the United States consumes vast quantities. Among these are vinyl resins, phenol-formaldehyde resins (bakelites) and vistanex, a polymerization product of unsaturated gaseous hydrocarbons with metallic halides to give substantially linear polymers ranging in consistency from that of a viscous oil to rubbery materials having molecular weights as high as 300,000; the list of such possibilities is a long one.

GENERAL

Technologic Composition and Properties of Roumanian Oil in 1936-1938—E. Casimir, in MONITEUR PETROL ROUMAIN, vol. 39 (1938), No. 15, pp. 1218-1233.

The author tabulates the laboratory data obtained on all crude petroleum samples (131) examined during 1936-38 in the laboratory of the Roumanian Geological Institute. The density varied between 0.685 and 0.904, the lightest being a practically colorless product from Margineni, and the heaviest an oil from the Gura Ocnitzei field. The general average gravity is 0.8550.

The content of light gasoline ranged from 0.7 percent to more than 20 percent (70 to 82 in the Margineni field). The heavy gasoline content ranged between 0.6 to 15 percent; these were non-parafin-

Welding drill pipe joints in the yard of the Lone Star Tool Co., Wichita Falls, Texas. (A) Completed box-end joints. (B) Completed pin-end joints.

Drill Pipe Joints now made PERMANENTLY TIGHT, LEAK-PROOF by *"Shield-Arc"* Welding

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(Procedure used by Lone Star Tool Co., Wichita Falls, Tex.)

1. Tighten pin end and box end joints under 15,000 lbs. pressure.

2. Pin end. Weld coupling to pipe with 3/16" "Fleetweld 5." Make weld tapered as shown in above illustrations.

3. Box end. Make several passes of high-strength weld with "Fleetweld 5." Add 3/4-inch of wear-resisting "Hardweld" metal, up to level of joint. (Use copper back-up clamp to make side face of weld flat for contact with elevator.)

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ous crudes. The kerosene content varied from 7.7 up to 39.5 percent in one case; some of these kerosenes are light (sp. gr. 0.786 to 0.794).

Gas oil is obtained in the percentages between 0 and 26; some of these gas oils have low specific gravities, 0.820 to 0.829. On the other hand some gas oils from non-paraffinous crudes have gravities up to 0.880. The Diesel index of these gas oils, calculated by multiplying the aniline point (in degrees F) by the A. P. I. gravity and dividing by 100, ranges between 31.1 and 75. According to this formula Roumanian gas oils fall into three classes, as follows:

Kind of gas oil	Diesel index
Non-paraffinous	31.0—44
Semi paraffinous	44.5—55
Paraffinous	59.0—75

The percentage of residue varies from 0 to 67 percent; these latter are from non-paraffinous crudes from the Moreni and Ochiuri fields. Some of these residues have low densities and low viscosities. The tabulated data accompanying this report is extensive.

Bacterial Action As A Cause of Spontaneous Oil Fires—Anon. PETROLEUM TIMES, vol. 40 (1938), No. 1,018, pp. 79-80.

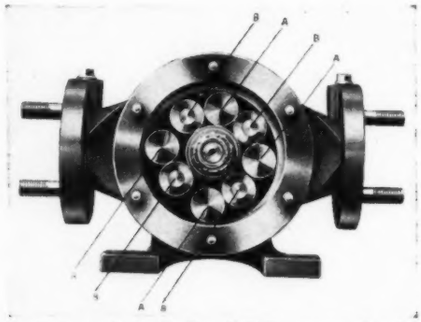
An official report on the explosion of a kerosene tank ascribes the accident to bacterial action. Some foul water (possibly contaminated with sewage) had accumulated at the bottom of the tank. The sludge in the water contained some iron sulphate and a large number of bacteria, including organisms that reduce sulphate to sulphide. The theory is that these bacteria obtained oxygen from the sulphate and produced methane and hydrogen as fermentation products. The methane and hydrogen accumulated in the air above the kerosene formed an explosive mixture that is much more easily ignited by accidental causes than the kerosene vapor, which has a much higher flash point.

As counter measures it is recommended that tank interiors have an alkaline coating to inhibit bacterial action, that fresh water be used for clearing pipelines instead of polluted harbor water, and that pipelines and tanks be electrically grounded.

A New Type of Rotary Oil Pump—Communicated to WORLD PETROLEUM by DRUM ENGINEERING CO., 1938.

A positive displacement rotary pump of new design which has found use in the oil industry is shown in the accompanying illustration (end view) There are two sets of rollers marked **A** and **B**. The **B's** are called pushing rollers. They are mounted and free to rotate on pins fixed to a disc which is keyed to the shaft. Between each pair of pushing rollers is a loose roller **A**, which is pushed or driven by the rollers **B**. When the shaft revolves, the loose rollers **A**, by reason of centrifugal action, fly out to the periphery of the casing. The shaft is mounted eccentrically with regard to the body, and due to the eccentricity the rollers approach and recede from each other, thus varying the volume enclosed by each cell or adjacent pair of loose rollers. This produces a pumping action and by suitable arrangement of ports in the casing, the liquid is drawn into and discharged from the pump. Since the only parts of the pump in contact are rolling it is possible to run the pumps at high speeds and to connect direct to a prime mover or electric motor, without intermediate gear. The pump gives a steady flow and, owing to its design, can be made to have any number of sets of rollers or cycles of operation per revolution. Usually the pumps are made of the five-cell type and when thus made give an even flow.

Volumetric efficiency, is of the order of 98 percent at 60 lb. per sq. in. on a pump having a displacement of 30 gal. per min.



End view of single-disc P.D.R. pump showing rollers and pins.

The body of the pump is of hard cast iron and the rollers of nickel cast iron; wear is negligible even when pumping light Diesel oil having substantially no lubricating property. Overall pumping efficiency with light oil is about 55 percent, with heavy oil 40 percent. Direction of flow can easily be reversed, which is of advantage in loading and discharging oil trucks.

What Hydrocarbons Pay to the (French) State—M. B. in REVUE PETROLIFERE, 1938, No. 802, pp. 1168-1169.

The author shows in detail the present income of the French Treasury from petroleum products in comparison with income from taxes on other commodities. For the year 1937 the various items are as follows:

	Millions of francs	Percent
Import duties:		
All commodities	6,605,819	
Gasoline and refined Oil	3,839,318	
Percent		58.12
Heavy oils and residues	562,113	
Percent		8.50
Percent on all hydrocarbons		66.62
Consumption taxes	1,812,969	
Percent on hydrocarbons		52.23
Overall percent on hydrocarbons		55.44

Tariff duties and consumption taxes on petroleum products thus contribute more than half of French revenue from similar taxes laid on 16 other basic raw materials, including coal, cotton, wine, grains, wool, machinery, coffee, rice, chemical products, copper, hides, wood pulp, and others.

(NOTE: It is the universal complaint of oil men that petroleum products have to bear a larger tax in proportion to actual manufacturing cost than any other commodity with the possible exception of alcohol contained in potable spirits, for which bibulous persons are ready and accustomed to pay high prices. But there is little use in kicking; the tax gatherers understand only too well that consumers must and will have gasoline and oil, and fiscal authorities can hardly be expected to do anything else than load the traffic with all it can bear. However, there is evidence that French oil taxes have about reached the point of diminishing returns.—ED.).

BOOKS

Petroleum World Annual Review of the California Petroleum Industry—published 1938 by RUSSELL PALMER, Los Angeles, Calif.; 350 pages.

This year's edition of this well-known annual review of California's petroleum industry exceeds all previous issues in size and content, reflecting the great activity of the industry in that state during the past year.

The editors present reviews of California's field activity, the state of the natural gas industry and the chemical trend of California refining. The new developments in petroleum equipment that have come with the search for oil at great depths are reviewed by A. H. Bell; the achievements of geophysics, which is credited with the discovery of 1,000,000,000 bbl. of oil to-date in California, where more than 30 geophysical crews were at work last year, are reviewed by Wm. D. Kleinpell.

The statistical part is complete and the use of maps and graphs to visualize the results of factory operations and field work has been extended. With more reason than ever it is possible to say of this volume that there are few facts of material importance in the California oil industry which it does not record and illuminate.

Proceedings of 11th National Asphalt Conference, 1937—Published 1938 by ASPHALT INSTITUTE, New York; paper, 176 pages.

This volume includes 18 formal papers, with discussions, relating to various phases of the use of asphalt in various classes of public works. A number of papers deal with the use of bituminous materials to stabilize subgrades in road construction. An interesting new application of asphalt is described in a paper by Colonel W. F. Tompkins; this relates to revetment and paving for the protection of river banks and levees against wave action and erosion. It consists in forming a mattress of soft asphalt and sand or loess on a reinforcement of galvanized wire fabric which is laid from the high water mark out as far as protection is desirable or necessary. These asphalt-sand-wire mattresses are used in other types of marine or river engineering works and require very considerable amounts of materials. For some purposes the asphalt mattresses are less expensive than bulkheads or riprap commonly used.

About Petroleum by J. G. Crowther—published 1938 by OXFORD UNIVERSITY PRESS, New York; 181 pages, illustrated. $2.25.

It is known that petroleum and its products are used by hundreds of millions of persons; and since there are 40,000,000 automobiles in the world there are at least 40,000,000 automobile drivers. There must be a considerable number of such persons who would appreciate a well written, elementary account of mineral oil, where it comes from, how it is got, and how it is transformed into the products on sale at filling stations, garages, and stores.

This book is written for such persons. The reader is taken through the history of oil, the oilfields and the refineries, and is gently inducted into the mysteries of the internal combustion engine. It can be recommended to the circles for which it has been intended.

Location of Automotive Diesel Troubles Made Easy—Published 1938 by NORMAN W. HENLEY PUBLISHING CO., New York. 50 cents.

This publication is a large chart intended to give a comprehensive survey of the common derangements that interfere with efficient operation of all types of direct injection four-cycle compression ignition motors. With the aid of three large diagrams and explanatory hints the engine attendant is shown how to diagnose such troubles as lost power and overheating, causes of smoke in exhaust, engine missing on 1, 2 or more cylinders, noisy operation of the power plant, spray nozzle troubles, knocking (fuel knocks), sudden stops of the engine, failure to start or hard starting, etc.

South Texas Oil—Published 1938 by IRA RINEHART. Reviewed on page 35.

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NEW—DOWELL RED SOLVENT

FOR ASPHALTIC PARAFFIN REMOVAL

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Dowell *Red* Solvent is the result of extensive study of paraffin problems throughout the United States. It is a running mate to the highly successful Dowell Orange Solvent, formerly known as Dowell Paraffin Solvent, and was especially developed for more effective action on the less pure, or asphaltic paraffins.

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With the development of Dowell *Red* Solvent, Dowell offers a paraffin solvent to meet a long felt need in practically every field. To reduce shut-down losses, cut pulling and pumping costs, Dowell paraffin solvents combine maximum efficiency with minimum cost.

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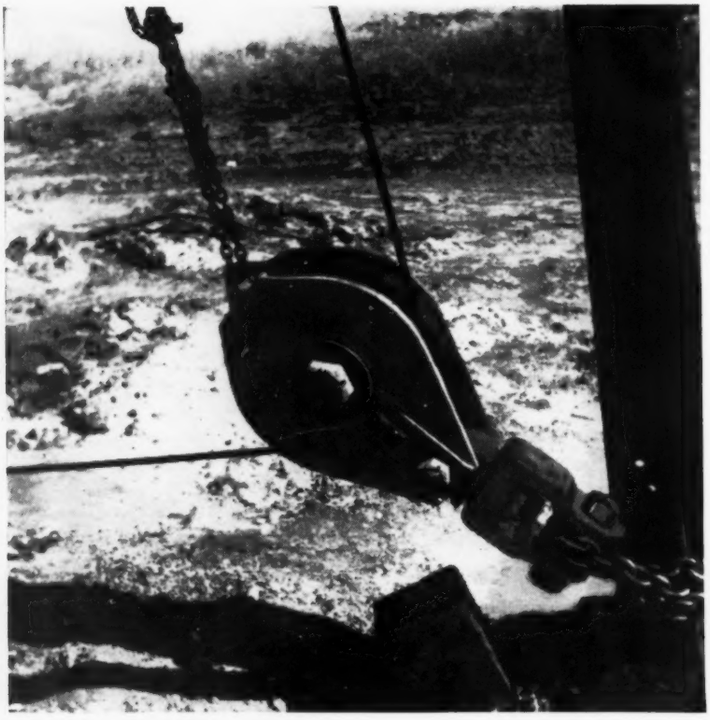
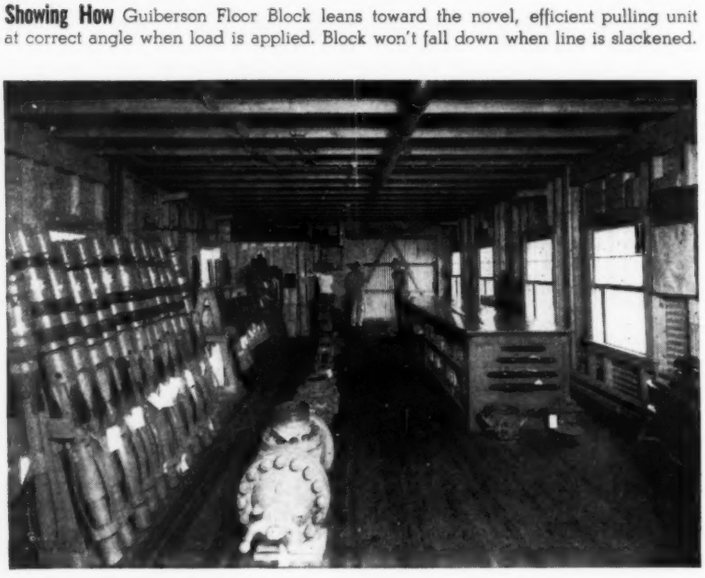


Guiberson Type A-1 Floor Block, on Kansas well, installed in derrick corner by means of special clevis, open at bottom permitting installation over eye bolt or cable loop.

On a Major Company's Well, near Wink, Texas, this Guiberson Type A-1 Floor Block is attached to an extension from the pulling unit by means of regular floor plate assembly.

Showing How Guiberson Floor Block leans toward the novel, efficient pulling unit at correct angle when load is applied. Block won't fall down when line is slackened.



This Guiberson Store at Kermit, Texas, carries stocks of Guiberson Swabs, Packers, Tubing Catchers, Floor Blocks, Drilling Heads, Oil Savers, Spiders, Rotary Pumps.

GUIBERSON FLOOR BLOCKS SAVE TIME AND TROUBLE

BECAUSE they are easy-to-install and easy-to-handle, Guiberson Floor Blocks save time and trouble. These blocks can be installed in the derrick corner by means of a special clevis assembly—or can be mounted on floor or extension from pulling unit by means of regular floor plate.

To facilitate handling, Guiberson Floor Blocks (1) have loops at the top; (2) have frames open at lower end, permitting blocks to be set over hoisting line without threading; (3) are designed, when used with floor plate, to permit a lateral movement to lean toward pulling unit at correct angle lateral movement of 45 degrees each way from vertical, which allows blocks to lean toward pulling unit at correct angle and prevents blocks from falling when line is slackened.

Guiberson Floor Blocks have two heavy-duty tapered roller bearing assemblies, easily adjusted from the outside. Center pin and bearing assembly are a self-contained unit, and bearing adjustment is unaffected by any distortion in frame. Frames and sheaves are cast steel (S.A.E. 3135).

There are two types of Guiberson Floor Blocks. Type A-1 has 16¼" O.D. sheave with ⅞" machined groove. Type B has 22" O.D. sheave with 1" machined groove. Frame of Type B is in two halves, forming safety guard around sheave. Capacities ample for wells of any depth.

See these blocks at your supply store or refer to 1938 Composite Catalog, pages 804-805. The Guiberson Corporation, Box 1106, Dallas, Texas. Export representative: I. Frank Brown, 30 Rockefeller Plaza, New York City.

TYPE B WITH SAFETY GUARD

U. S. S. R.

Official Figures for Soviet Oil Operation

1938	Production bbl.	Daily Average bbl.	Run to Stills bbl.	Drilling feet
January	17,647,000	569,258	15,882,000	520,000
February	13,591,000	485,393	13,122,000	320,000
March	15,984,000	515,613	14,842,000	340,000
April	17,850,000	595,000	15,850,000	400,000
May	17,580,000	567,097	15,600,000	420,000
June	18,540,000	618,000	15,900,000	550,000
July	18,200,000	587,097	16,800,000	500,000
August	18,000,000	580,645	16,800,000	510,000
September	18,200,000	606,667	16,600,000	500,000
Total 9 Mos. 1938	155,592,000	569,935	142,196,000	4,160,000
Total 9 Mos. 1937	150,733,660	552,138	139,860,000	4,684,660
Total 1937	202,856,661	555,772	187,121,389	6,244,660
Total 1936	199,634,921	545,450	180,588,274	6,958,916
Quota 1938	244,215,000*	666,066	215,055,000	not available
Quota 1937	234,450,000	642,329	208,285,000	9,240,000
Quota 1936	222,345,000	607,000	182,250,000	7,100,000

*Crude oil and gas

Transporting a derrick by tractor in the Krasnokamsk oilfield, Sverdlovsk region.

© Sovfoto

TRANSFER of complete drilling rigs from one well-site to another represents a new phase of Soviet oilfield practice. Contrary to American practice, wooden derricks are transported by tractor as well as those of steel construction.

When the Soviets had electrified all oilfield operations they did away with steam and gas engines as a source of power and drilling was not commenced until electrical power supplies were assured. All equipment was of a permanent type, and with the completion of several wells it became necessary to erect a machine shop to provide for repairs and spare parts—causing a great deal of trouble. Drilling a single prospecting well, particularly in outer regions, took a year or more.

When in 1936 it was decided to use steam or whatever other source of drilling power might be most convenient, the Soviet introduced a number of innovations by way of lighter or portable equipment. Where water was available for drilling operations the steam boilers were set up as temporary units. Likewise, gas or other engines were of light-weight type and the 90 to 95 ft. wood or steel derricks were so designed as to facilitate removal to new sites when drilling was completed.

With considerable improvements in drilling speed, oil well completion now takes much less time, and in many instances where a well formerly took a year or even more to drill the same depth can be reached in a month or two. This is especially true, of course, in the case of drilling to Stakhanov tempo (where operations are conducted with special care and unhindered delivery of supplies), but even in routine operations, where breakdowns are frequent, drilling is accomplished much faster than before.

STAKHANOV DRILLING

Introduction of Stakhanov drilling over a wider area has produced some outstanding results, although routine drilling is far from satisfactory. Several operators at Baku, Grozni and other fields have completed wells from 40 to 50 days ahead of plan—depths of 5,000 to 6,000 ft. were drilled in six weeks to two months with speeds of 2,500 ft. per table-month and even higher. Under Stakhanov tempo, depths for which time was set at 70 to 75 days have been drilled in 24 days, and after interruption of three or four days 95 ft. metal or wooden rigs have been set up in 90 to 100 hr.

Although the shock troops of Stakhanovite drillers in Soviet oilfields are on the increase, routine drilling operations are still unsatisfactory. Plan for 1938 called for an average speed of 1,915 ft. per table-month—based on 2,540 ft. for drilling in proven areas and 1,200 ft. for prospecting. Actual drilling speed as shown by the preliminary reports for the first half of 1938 has amounted to an average of 1,336 ft.—1,960 ft. for production and 706 ft. for prospecting. The July average for Baku increased to 1,364 ft. and in August rose to 1,435 ft.

A comparison between Stakhanov operation and routine drilling of wells up to 7,000 ft. deep at various oilfields of Baku shows the following:

	Stakhanov (Days)	Routine
Rig building	12	32
Breakdowns	3	14
Mounting Equipment	6	21
Delays before drilling	5	16
Drilling proper	30	154
Total	56	237

(Continued on page 64)

STRAIGHT TALK.... about CROOKED HOLES

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SPECIAL WEEKLY RATES

ATLANTIC CITY

(Continued from page 63)

REMEDIES

The Soviet Commissar for Heavy Industries issued a decree on September 15th to the effect that thorough investigation of Soviet oilfield operations has shown that drilling is lagging behind expectations and that this is jeopardizing plan fulfillment for 1938 as well as preparations for the 1939 quota. Preliminary figures for the first eight months of this year show that Vostokneft is fulfilling plan only 27.2 percent, while Bashkiria is 31.0 percent, Baku prospecting 44.1 percent and Grozni prospecting 42.8 percent.

A warning has been given to all drillers to live up to plan. The chiefs of the drilling divisions are to be held responsible, but at the same time were promised all necessary assistance on the part of the socialist party in the form of maintaining continuous delivery of supplies, tools and equipment. A conference on drilling is to be called among the chiefs of operation, but in the meantime the head of Vostokneft has been removed for inefficiency and the superintendents of Baku prospecting and Grozni capital building have received a warning.

JUGGLING THE RECORDS

Molgabek operators have originated a swindle, claimed to be both novel to Grozni and unusual for Soviet oilfield practice—let us hope that it is so, if we are to place any great faith in the official production figures which we publish each month. This trick is to exaggerate production figures and substantiate the exaggeration by making deliveries from storage instead of actual output. Owing to lack of storage facilities, Molgabek oil operators had dug a number of earthen reservoirs for storage of crude oil. These lakes hold from 5,000 to 7,000 tons of oil—for which the operators were paid in full when the crude was produced and delivery made to storage. When production began to run below plan and the operators were short of deliveries they considered it quite fair to draw upon this oil in storage to fill their quota—receiving payment in full from the state treasury for oil which had alreeady been purchased. The trick was revealed when it was discovered that there was in storage only about 15 percent of the oil shown in the records, and investigation revealed fraudulent manipulations equal to the shortage.

TRANSPORT AND STORAGE

Because of the requirements of improved quantity and quality of petroleum products the Soviet oil industry will not only have to

(Continued on page 66)

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2. Blanks for Axelson collars, cut to proper length, are drilled to semi-finish bore size on turret lathes.

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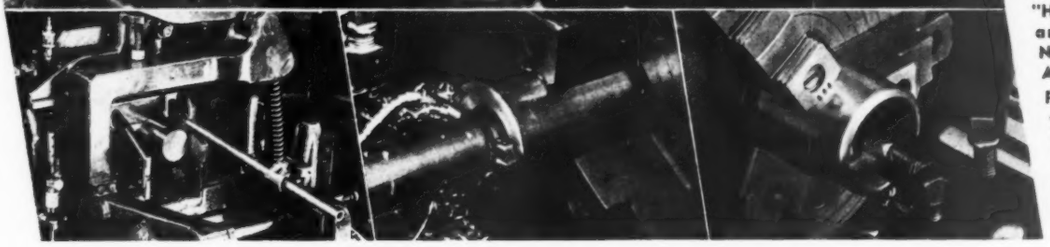
THERE IS ONE AT THE TOP AND ONE AT THE BOTTOM OF EVERY PUMP



1. Blanks of cold rolled steel for Axelson pump collars are cut to length by automatic power hack saws.

3. After semi-finish boring, collars are then semi-finish counter-bored preparatory to finishing to size.

4. Collars are next counter-bored to finished diameter for jacket threads and checked for size.

There are some words that are never used in the Axelson factories. "Hurry" is one of them; "get-by" and "good enough" are others. Nothing is ever "good enough" in Axelson practice until it is the "best possible."

There is nothing better on earth than the solid cold rolled bar stock that Axelson uses for collars today. If there is anything better tomorrow, Axelson will have it. This is the policy that Axelson adopted forty-six years ago—it is the same policy that is still followed in Axelson plants today.

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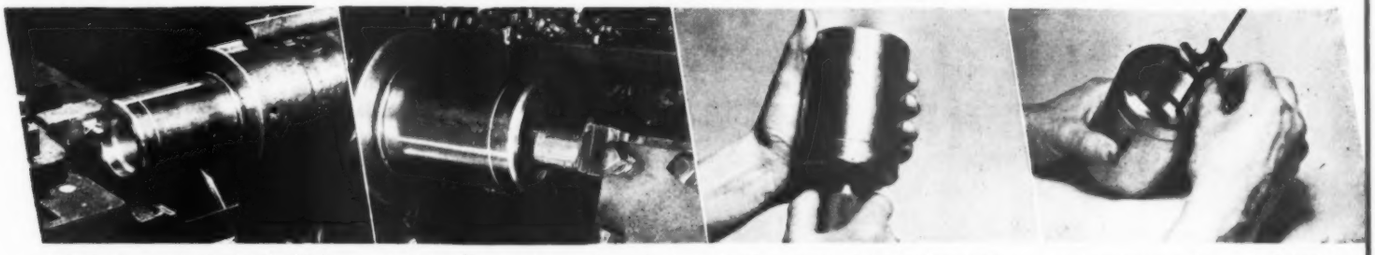
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

5. The face of the collars which clamps against the ends of the liners is finished to a smooth, flat surface.

6. Axelson multiple thread circular chasers are used to produce jacket threads in one end of the collars.

7. The operator gages each finished jacket thread for proper fit, after which inspector checks operator's gaging.

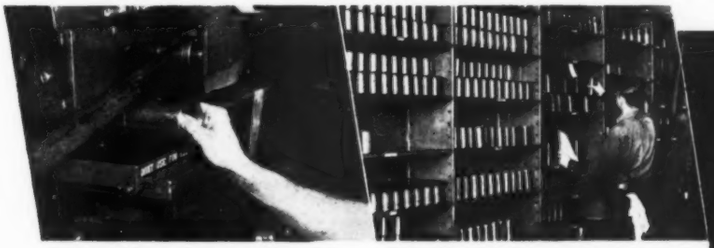


8. Collar is screwed on master chuck to be faced and radius machined on other end. Master chuck insures alignment of ends.

9. Next, tubing end is rough and finish bored. Axelson multiple thread circular chasers produce tubing threads.

10. Operator checks tubing threads after which the inspector verifies with plug gage that threads are correct.

11. Inspectors next give final check to other collar dimensions, i.e., length of threads, over-all length, etc.



12. Each collar is marked for identification with part number, size and other coding.

13. Axelson collars are stored in steel shelving after having been washed and coated with rust preventive solution.

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(Continued from page 64)

build refineries and modernize existing installations, but will also have to rehabilitate storage and transportation facilities.

Inadequate storage facilities exist for crude oil, with the result that various grades have to be mixed; similarly, with regard to refined products. Kerosene for industrial purposes has to be stored together with kerosene for illumination, while lubricating oil is often stored in open reservoirs dug for the purpose in the ground. The storage facilities that are available are not kept properly cleaned, and are for the most part lacking in dehydrating facilities. Hose, pumps, as well as measuring and testing instruments are kept in a filthy condition. Lack of hermetization not only causes evaporation but permits free entry of impurities.

When crude oil is delivered to the refineries it is not only composed of mixed grades, but contains water and other impurities. The Guryev-Orsk pipeline carries crude from the Kaschagil oilfield; this crude contains 16 percent of good grade lubricating oil suitable for aviation use, as well as high-octane gasoline, but handling during transportation is so incompetent that Koschagil crude yields a plain grade of gasoline and no lubricating oil whatever.

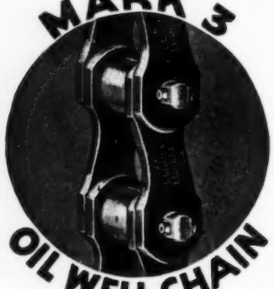
Shipments of refined products are frequently made without escorting documents of specifications, with considerable resultant confusion.

Glavneft's inspection department, which is empowered with the authority to accept or reject products of quality lower than the desired standard, is often left facing a dilemma of either having a shortage of deliveries or accepting products of poor quality, and is thus shorn of its powers.

J. WEGRIN.

RENOLD

MARK 3



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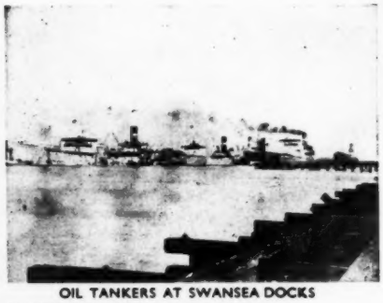

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